It's your world

The Grassroots Conservation Story

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UNITED STATES DEPARTMENT OF THE INTERIOR CONSERVATION YE

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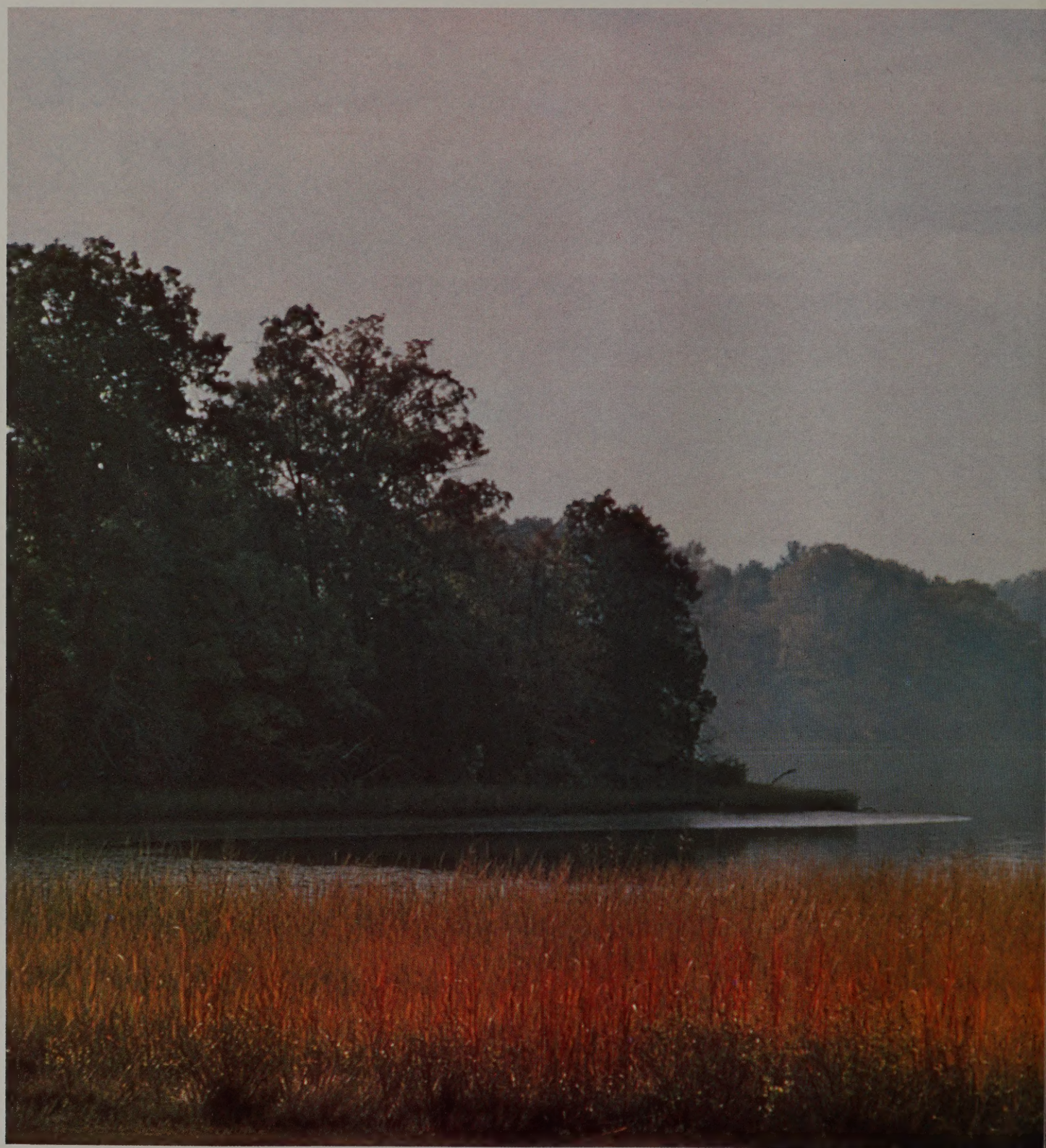
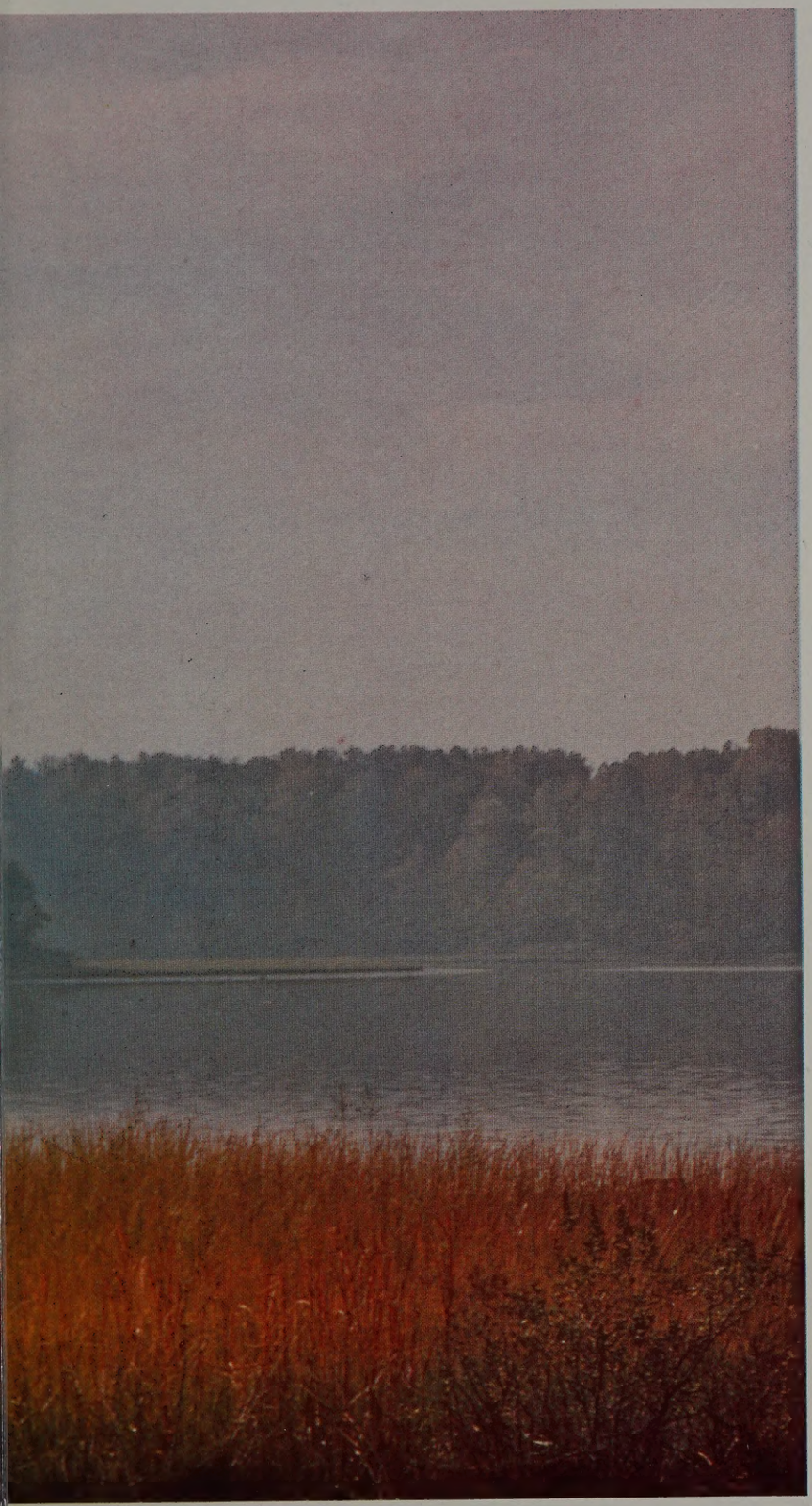
The Grassroots Conservation Story

"I believe a leaf of grass is no less than the journeywork of the stars"

Walt Whitman
"Song of Myself"

EARBOOK #5





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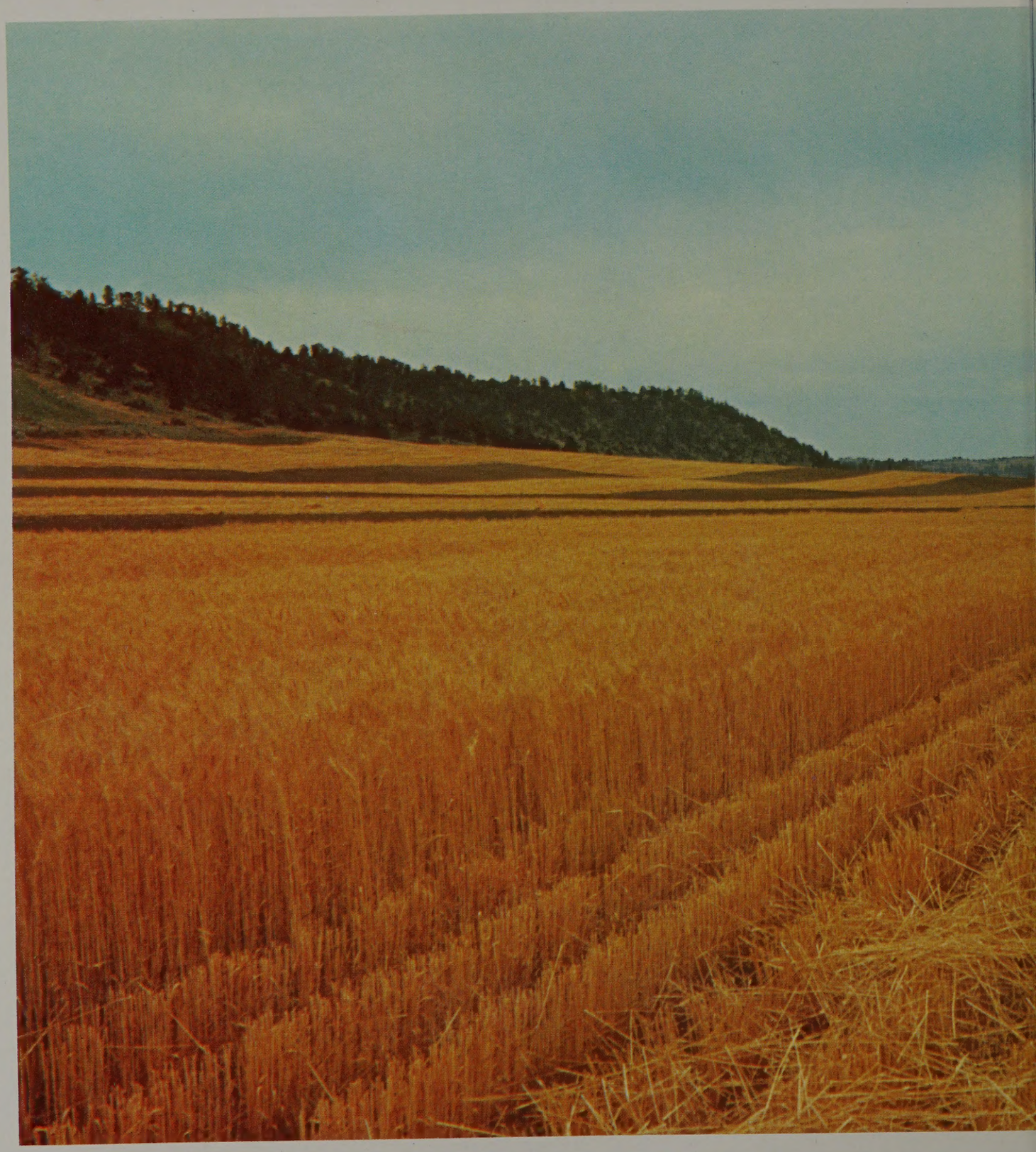
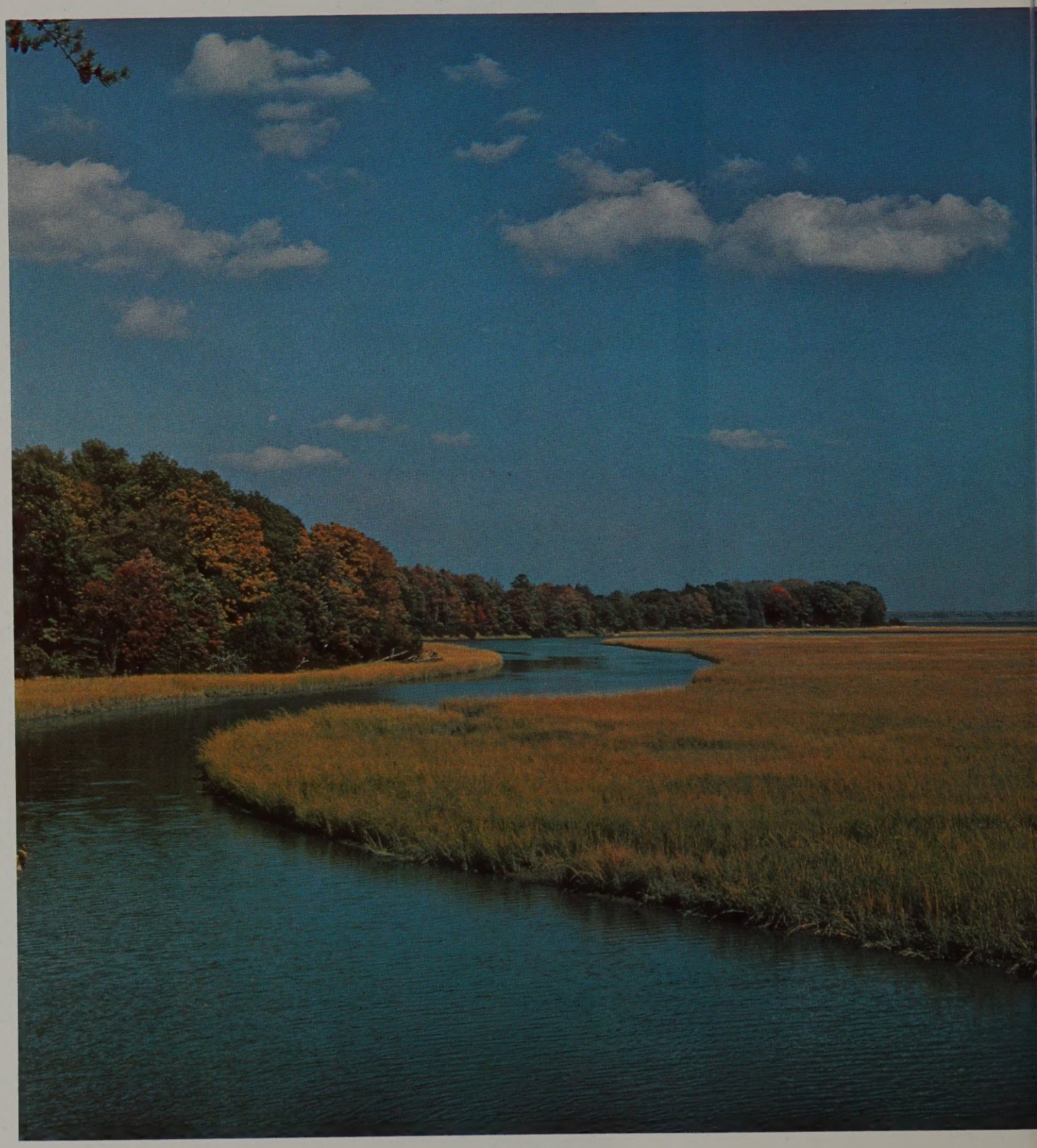
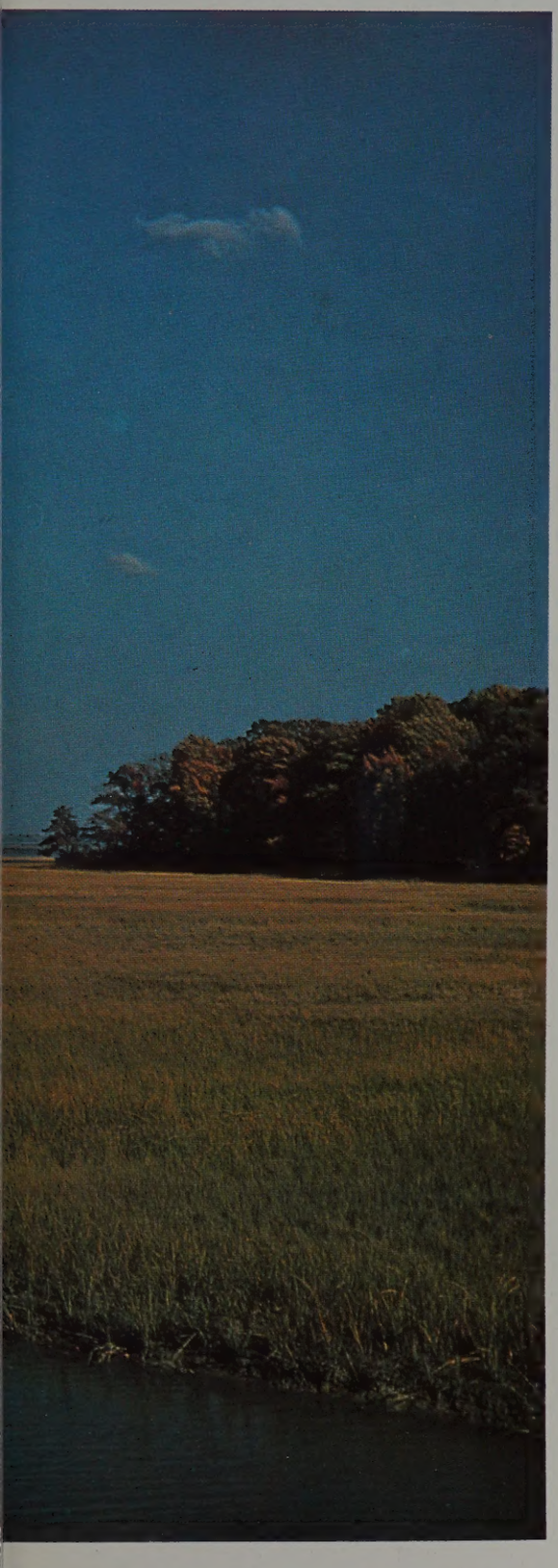
The Grassroots Conservation Story

Grassroots are Nature's numerous servants.
They hold the earth together . . .
They channel raindrops down into the ground . . .
to water plantlife and to replenish
underground aquifers.
Grassroots are among conservation's most
basic natural tools.

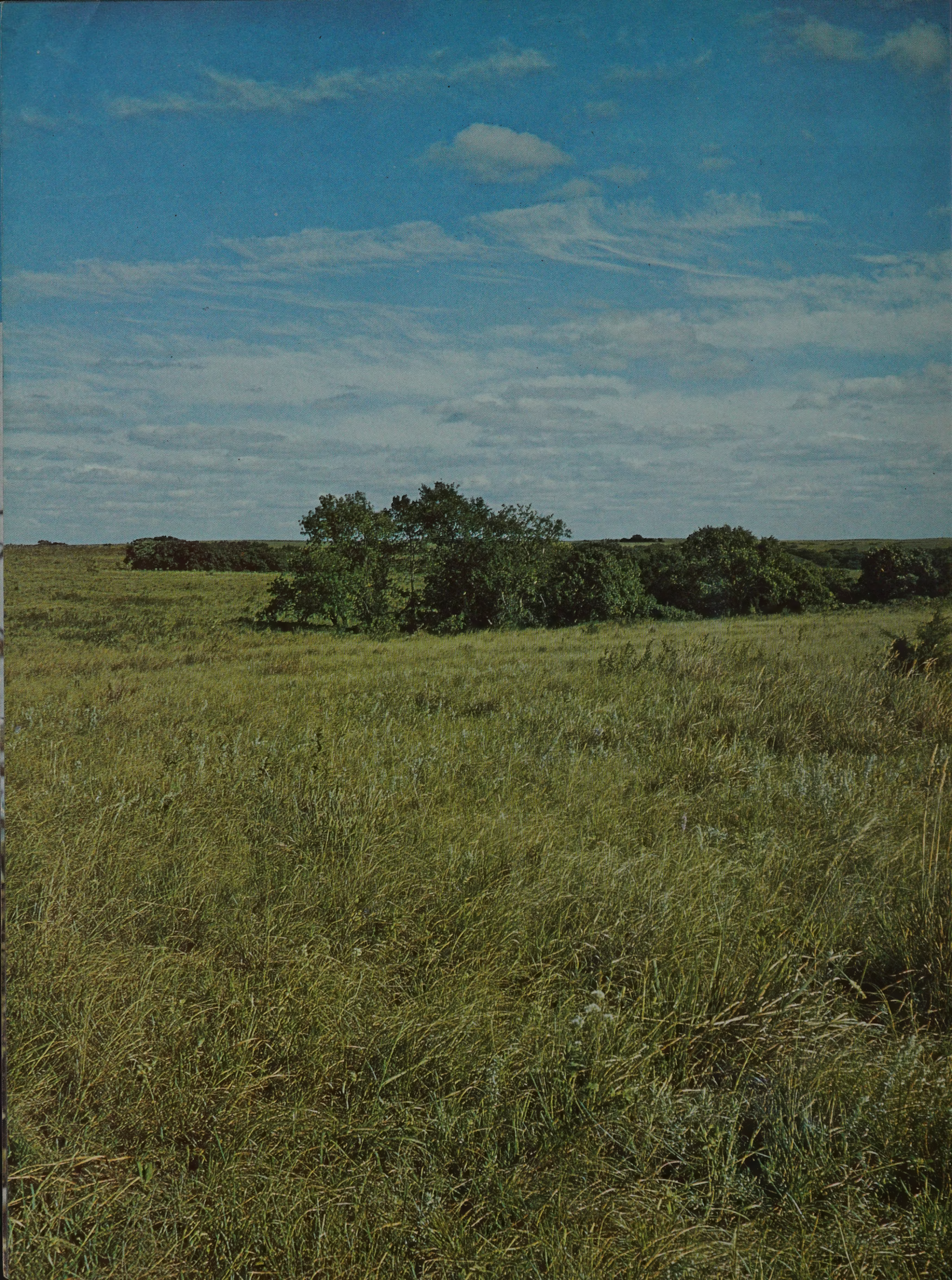


Long after the grass came the People.
They saw the beauty of grass as
the robe of Earth . . .
They learned the importance of grass
as Nature's good steward . . .
When the People had a big job to do,
they copied Nature. They called
their cooperative successes
"a grassroots movement."





Conservation is one of the biggest jobs facing People today.
As the roots of grass reach out and intertwine, they strengthen their hold on the soil and water.
As People act together to improve their habitat, they strengthen the quality of their entire natural world.



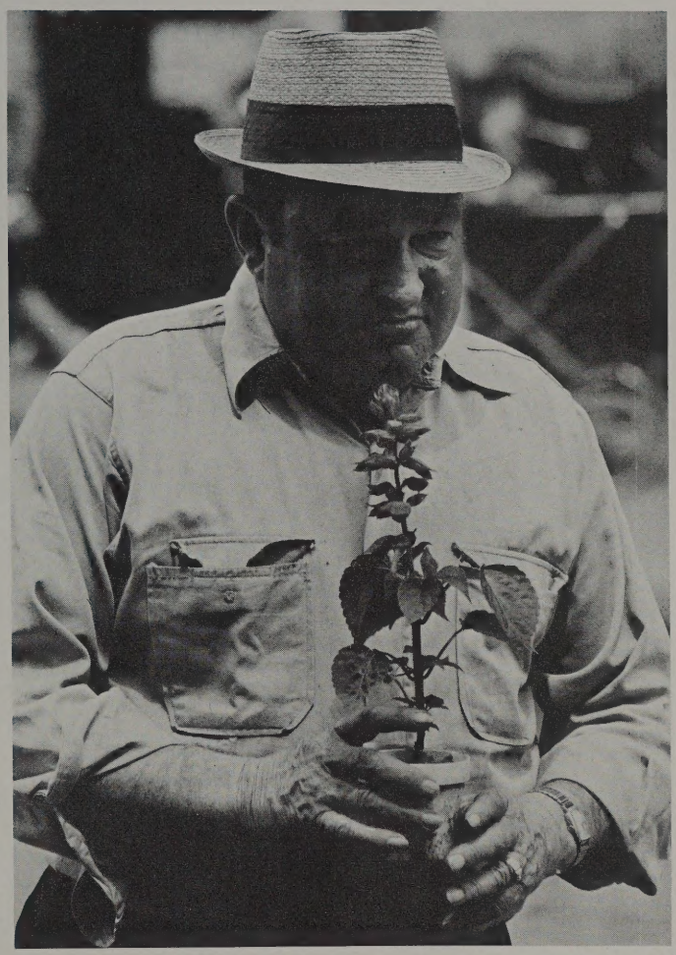
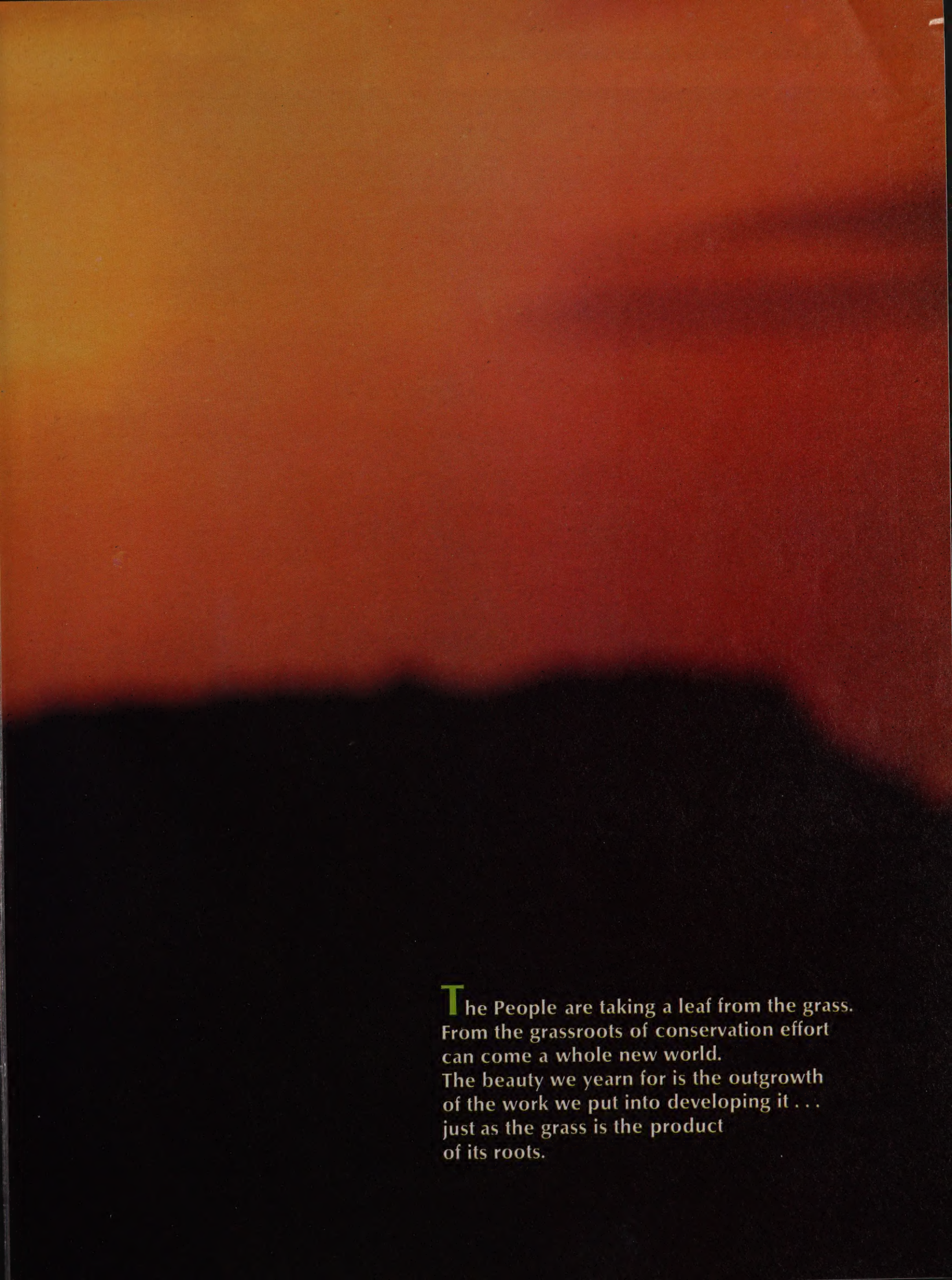


PHOTO BY FRANK HOY — THE WASHINGTON POST

One tiny blade of grass, multiplied by millions, makes a Great Prairie.
One simple act of conservation, multiplied by millions, makes a Great Environment.

Wherever there is grass, only great care
can prevent weeds.
A truly splendid environment doesn't just
"happen" except in untouched wilderness.
Wherever there are People, constant care
is needed to guard--against People.
Only by being our own sternest taskmaster
can we keep from being our own worst enemy.



The People are taking a leaf from the grass.
From the grassroots of conservation effort
can come a whole new world.
The beauty we yearn for is the outgrowth
of the work we put into developing it . . .
just as the grass is the product
of its roots.

Introduction

The conservation goal of America's third century as a nation must be the development and protection of a quality environment which serves both the demands of nature for ecological balance and the demands of man for social and psychological balance.

The landscapes and cityscapes that comprise the face of our continent present a partial statement about the state of our civilization, in much the same manner as the cut of a man's clothes tells something of the man himself. As the republic nears its 200th birthday, the cut of the countryside bespeaks ambivalence.

The need for a new national attitude toward our environment has grown until today it is an absolute necessity for human survival. Technology has stretched and magnified our natural resource potential in many areas. It has also supplied a harassed people with an infinite number of painkillers and tranquilizers. But it cannot provide us with one square inch of additional planetary surface, nor do more than gloss over the mounting environmental insults to humanity.

It becomes increasingly apparent that runaway population, noise and psychological pressures of too-close living will eventually run us out of space and nervous energy even if food and minerals and fuels were never to flag.

Any new national attitude toward natural resources must take into consideration at least two factors—the quality of human life we seek to establish, and the specific meld of environmental ingredients that make up that quality. Both of these goals require methodology if we are to achieve them.

First, in order to identify the standard of quality we seek, *we must set up a whole new value system,* with indices for measuring the "desirables" (i.e. serenity, beauty, quiet, etc.) and the "undesirables" (noise, clutter, pollution, congestion, etc.); and then we must come to some workable national consensus as to where, on this quality scale, we would peg our environment.

Do we want *all* water pure enough to drink, to swim in, to boat on (and so on, down a sliding scale to the dead oxygenless fluid that passes as "water" in too many stream-sewers today)? If not, then *which* waterways should be of what standard of purity and for what purposes? These are the *kinds* of questions we must ask ourselves and answer before we can fulfill the first requirement for a new national attitude toward natural resources.

Second, we need a system of measurements to determine which value takes priority over another, or which of several values can be combined, to assure the use of available space and resources in a manner that will result in the environmental quality we have previously agreed upon as our goal.

Admittedly, this is no small order. But consider the alternative.

Today we are allowing priorities in use (and abuse) to be established by default, instead of assigning them with some rationale and purpose. The movers and ef-

"The face and character of our country are determined by what we do with America and its resources . . ."

Thomas Jefferson

fecters of these priority decisions are haphazard, dollar-directed, first-come-first-served, and utterly disconnected from any overall consideration of either life or the land, let alone the two interconnectedly.

The total environment approach to planning would insist that all "side effects" be evaluated before any final decisions are made: no swamp would be filled, no new jetport sited, no nuclear power plant built, until the community as a whole had weighed the alternatives and determined that all possible actions had been taken to make the proposed development compatible with order and beauty.

Often, if we are honest in assessing *all* the interrelationships that our action will involve, we will find that the term "side effect" must be upgraded to "direct effect."

The ecological approach to human survival on a planet-wide scale will not, for instance, tolerate the starvation of millions of human beings to be viewed as a "side effect" of up-graded health facilities that save lives without any attendant efforts at limiting births or increasing food supplies for a mounting number of mouths. In this case, mass starvation must be coldly viewed as the *direct effect* of improved health services. It is this kind of clear, bold thinking that will be necessary if we are to get the right answers we seek.

Technology is our tool, for better or for worse; how we use its power depends upon how successful we are in setting goals and in implementing our social efforts to achieve them. President Howard W. Johnson of Massachusetts Institute of Technology said recently, "Technology is at once our blessing and our bane, the well-spring of our aspirations, yet the threat to our well-being. Technology is both social benefactor and social calamity."

Our growing capacity to induce change has pointed up the dire necessity of matching this capacity with the ability to control it. But how is this control to be found? In human society, where people tend to band together in groups, where is the role for the individual?

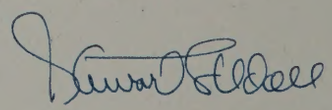
Perhaps the most sorely needed individuals today are the "discriminating critics." These may be members of any of the myriad social groups united for this or that social action. Each group is self-centered and single-minded; focused on road-building, or dam-building, or real estate development, or natural resource processing, or fishing, or hunting, or camping. One man can belong to several of these groups and find himself working in one, to defeat his own purposes in another.

Out of these groups, with their single, selfish goals, must come individuals who can find, somehow, the means and the mass courage to define and accept humanistic as well as technological goals. We must cast these goals into a new environmental "ethic" and we must effect legislation to influence the conservative herd tendency that is human and natural. We cannot dispense with the group structure of society without incurring anarchy and chaos, but we cannot stand silent and still while unprogrammed technology alters the real world and changes our lives along with it.

The times call out for individuals who will assume the risk of discriminatory judgments. Only when such voices are raised, within the various social groups and outside them as well, will we move toward narrowing the gap between what we profess and what we do. Such courageous critics—such doughty discriminators—must be men and women of universal views. They alone can overcome the inherent concern of our various "groups" to maintain the status quo through what has been described as "complacent conspiracies of judgment." They alone can translate our knowledge and technology into effective social action.

This constitutes the highest challenge to individual participation in the new conservation movement. If we find ourselves unable to meet the challenges of technological change, it will be because we failed to generate the discriminating thinkers—those who would challenge the herd psychology and without destroying the groups, nevertheless achieve a forward shift in the centers of traditional belief.

It is a tall order. But these are tall and turbulent times, and hopefully we have men and women to meet them. Whatever the cast of the national mind that eventually prevails, it will be nowhere so faithfully mirrored as in the environment of tomorrow.



Secretary of the Interior

"The new conservation is work not for some Americans—but for all Americans. All will share its blessings—and all will suffer if the work is neglected . . ."

President Lyndon B. Johnson, March 11, 1968

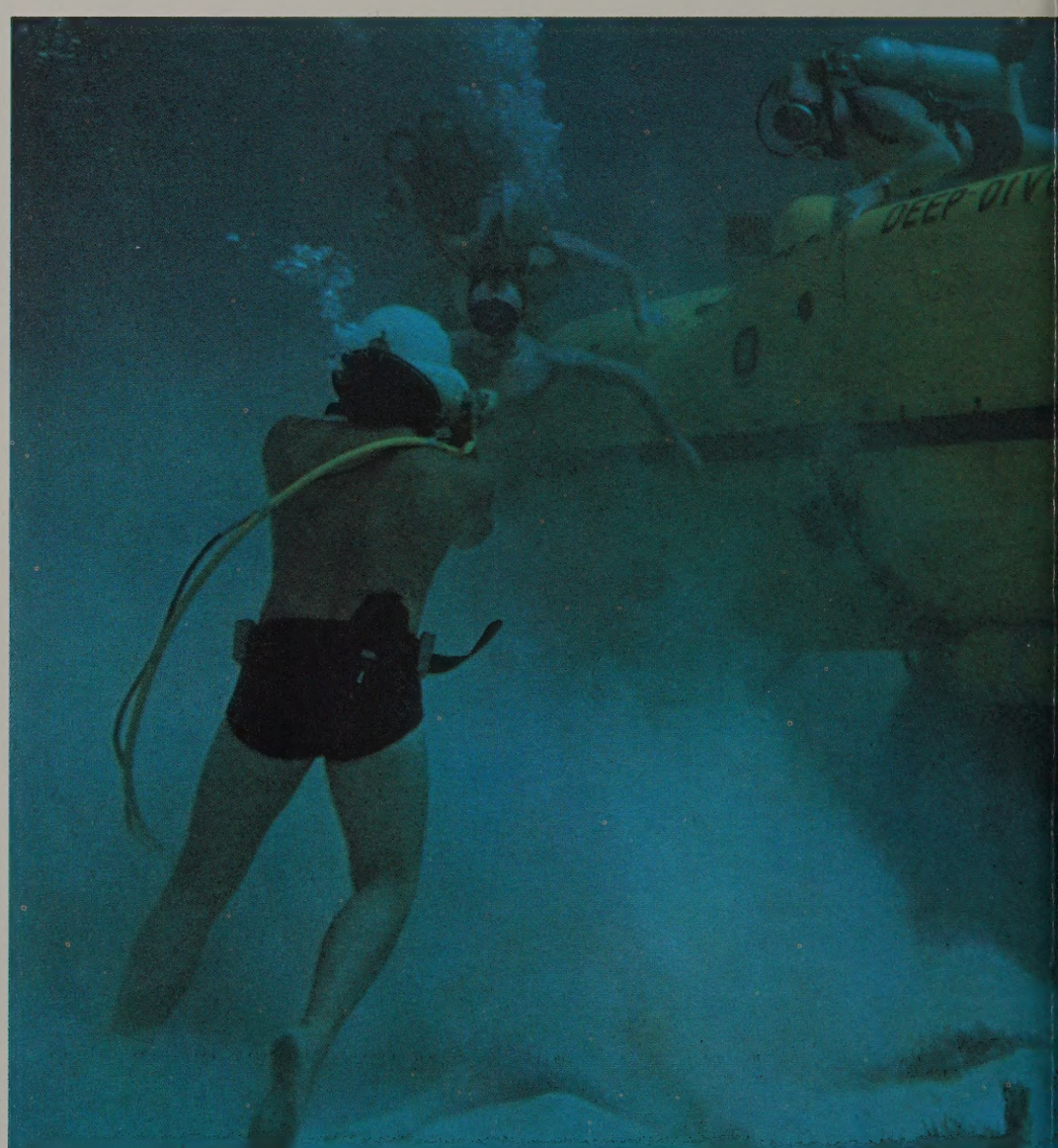
Fish and Wildlife Resources

"The concept of conservation of our natural resource values demands a fuller and more knowledgeable understanding among our citizens of today than ever required heretofore in our nation's history. Our needs in all uses have pyramided. Only an intelligent and selfless citizenry can cope successfully with the problems involved."

Congressman Wayne N. Aspinall
Colorado

Fish and Wildlife Resources

The bright light of self-interest probes the depths, sails the skies, and skims the surfaces of the planet — all as part of man's unending search for knowledge of himself and his world



© National Geographic Magazine

Bureau of Commercial Fisheries

Nowhere is the need for practical piety more apparent than in marine conservation.

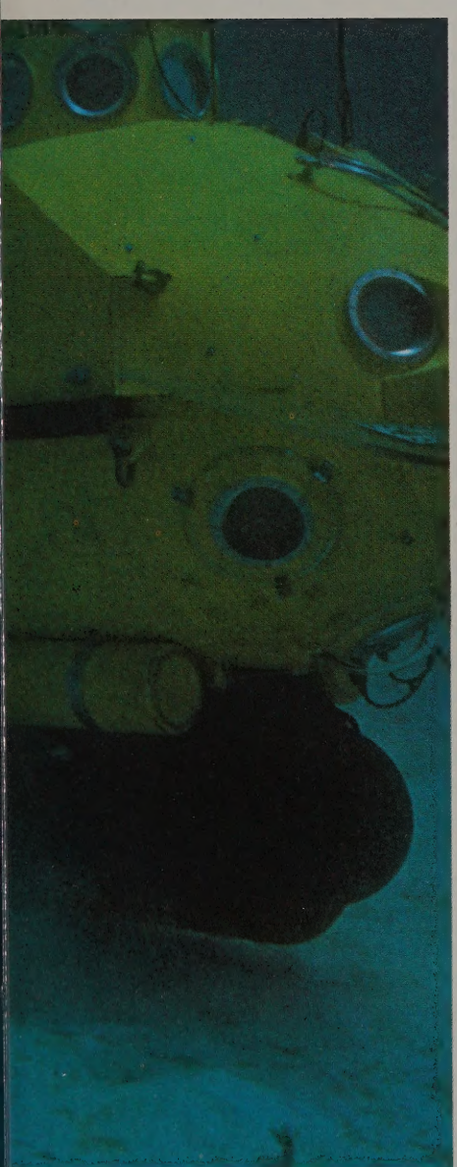
To avoid degeneration into an exercise of aimless guardianship, marine conservation must be a matter of economics as well as ecology; of utilization as well as preservation; of survival rather than mere sentimentality . . . in short, a matter of enlightened self-interest.

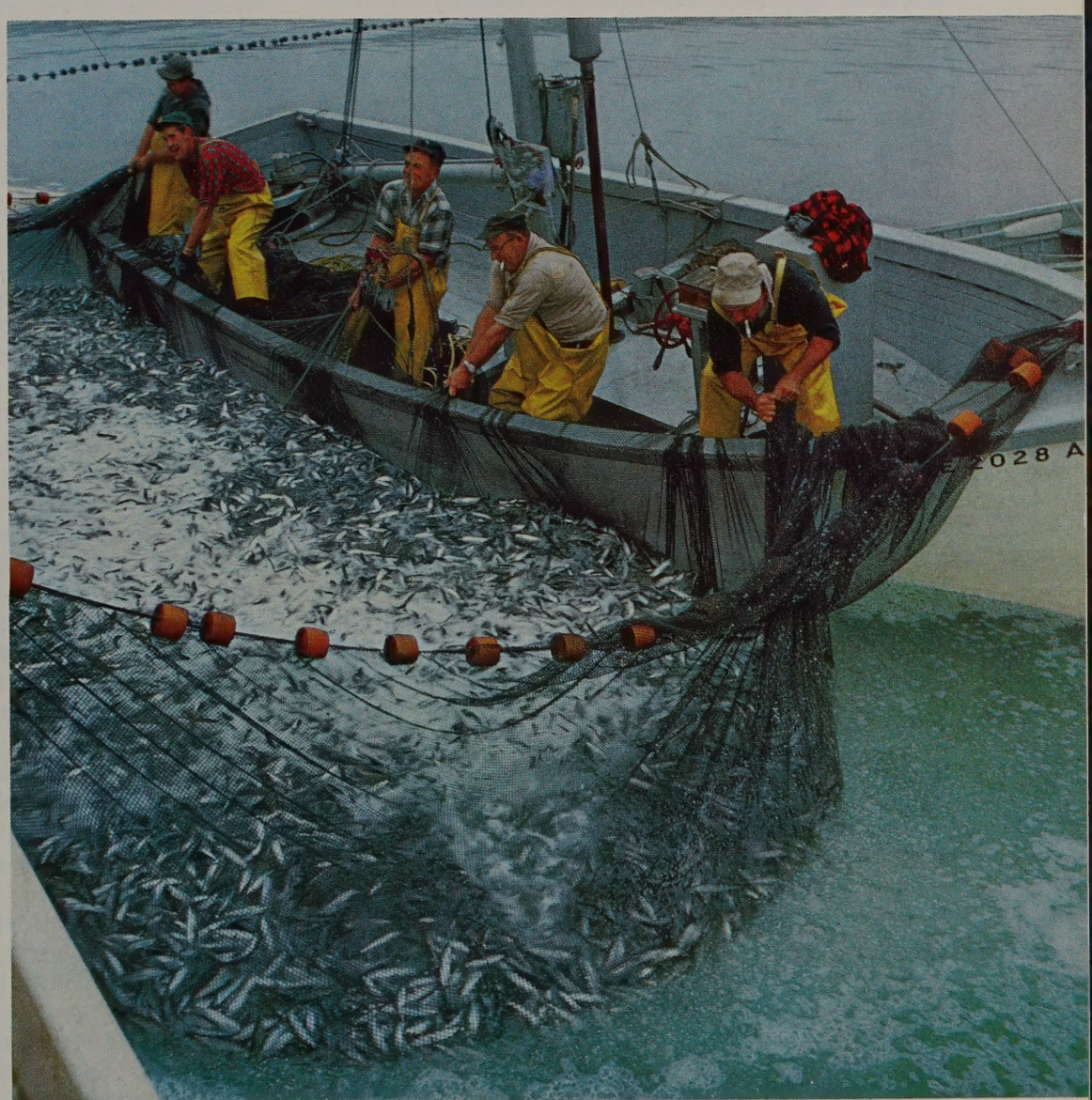
In the past, it has been customary to regard conservation as the province of venerable maiden ladies and eccentric scientists, all endowed with the Victorian belief that only Man is vile in this best of all possible worlds.

The new grassroots conservationist is a different breed — tough, unapologetic, informed, and involved. He is vocal and articulate. He knows how to make himself heard, and he gets things done.

Likewise, the conservationist-scientist has come down from his ivory tower. In the laboratory, he is concerned not only with prying loose the most closely-kept secrets of nature, but also with such matters as the economics of utilization — the balancing of industrial or engineering advantages against a biological need for room to roam — the problems of processing, distribution, and marketing as well as discovery of nutritionally rich food sources.

In the community, he is found in close company with the lay conservationist — participating in the local Scout program, working as a member of a PTA committee, or serving on planning boards, where conservation principles meet their real test.



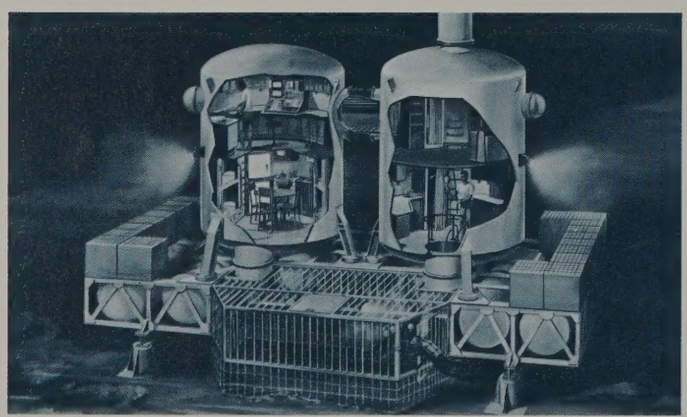


The Bureau of Commercial Fisheries (BCF), with its strategically located laboratories and field stations, typifies both the environmental approach and the intense practicality of grassroots conservation.

The network stretches from the inland fisheries, out across the fertile and vulnerable estuarine complex, and into the mysterious abyss of the ocean.

Whether the immediate problem is the ecology of reservoirs, raising oysters on a raft at the ocean's edge, the tedious and painstaking work of identifying a marine organism, or using the delicate ears of sonar to locate schools of fish, effective marine conservation involves four concepts — discovery, utilization, preservation, and education.

Although Washington is the national nerve center for coordinating Federal programs, the success or failure of marine conservation depends first upon activity at the local level. It is here that needs are most immediately felt, and it is here that solutions must be applied. Around the nation, BCF personnel analyze conservation needs and work out the answers in close cooperation with state agencies, universities, and industry.



Undersea home where 4 scientists will spend 60 days.

Some of this work, such as the cruises of research vessels, may carry the aura of adventure and romance, together with the additional satisfaction of almost immediate economic impact on the fishing industry.

Exploratory fishing cruises pinpoint location and abundance of various commercial species; cruise reports, made available to the industry, enable the commercial fisherman to concentrate his efforts where the fish are.

Underwater Living Studied

In an adventure straight from a Jules Verne fantasy, BCF scientists in 1968 made plans to spend two solid months living and working 50 feet under the ocean surface. Operation Tektite-I was planned as a cooperative venture with NASA, the Navy, various bureaus of the Department of the Interior, and private industry.

NASA contemplates esoteric applications of the findings: Notes on the behavior of a small group of men doing a scientific research job while subject to the stresses of isolation and life in an unnatural element, will aid in planning future space voyages.

For commercial fisheries, the benefits may be less romantic, but equally vital and perhaps more immediate — what better way to provide marine biologists with an unprecedented opportunity for first-hand studies of marine life in the natural environment?

An army travels on its stomach, necessitating many man-hours spent in such unheroic pursuits as peeling potatoes and washing dishes; likewise, conservation research lurches forward with occasional spectacular results built on hours and months and years of tedious and unrewarding work — theories disproved . . . microscopic organisms identified, counted, catalogued . . . statistics gathered and tabulated and interpreted . . . life histories scrutinized . . . new and fantastically sophisticated tools of research developed . . . and the whole effort turning on three small giants of words: why . . . how . . . if . . .

In the Bureau of Commercial Fisheries, the slow work of conservation takes many forms.

Life Cycle Knowledge Sought

Under the awesome chapter heading of "taxonomic studies," life cycles of commercially important species are traced and charted. Like the growing grasshopper, marine life may change only slightly from stage to stage; or it may take the steps toward maturity in amazing biological quantum jumps, like the caterpillar that immobilizes itself in a chrysalis to emerge in winged splendor. As pieces of the identity puzzle are edged slowly and patiently into place, biologists are sometimes mildly embarrassed to find that what was once classified as a different fish or crustacean is simply "someone else" in a youthful or intermediate stage.

The battle of marine conservation must be waged on all levels; it is pointless to attempt to preserve the adult fish if the fingerling of the same species faces extinction through disease, predators, starvation, or man-made environmental change.

In Alaskan waters, thousands of king crabs have been caught and tagged as biologists attempt to trace growth and migration patterns of the ungainly crustacean that has achieved such widespread popularity among gourmets. With the harvest skyrocketing from 9 million pounds in 1956 to a record 159 million pounds in 1966, and in the face of strenuous competition from foreign fishermen, the need for extensive data as a sound basis for conservation regulations is obvious.

Cater-corner across the continent, a new packaging plan has offered dramatic possibilities for extending the shelf life and marketing area of fresh fish. The BCF technological laboratory in Gloucester, Mass., has developed a shipping container that can be used to transport fresh, unfrozen seafood over formerly prohibitive distances. One experimental shipment, approximately 100 hours in transit, went eastward around the world from New England to San Francisco, and arrived in excellent condition with a high-quality shelf life estimated at eight days.

Obviously, super-efficient shipping containers are use-

ful only if the fish are being caught. BCF gear research stations wrestle with the problem of devising more effective fishing methods and equipment.

One improvement, an electrified trawl tested by the Pascagoula, Miss., station, could well open up daylight hours for the brown shrimp fishery. In this study, as in many others, the apparently diverse fields of technology and biology again dovetail. Both pink and brown shrimp burrow into the bottom during the day, and come out to forage at night. Consequently, the fisherman who goes after either species only with conventional gear is restricted to night fishing.

Used during daylight hours, the electrified trawl delivers a slight current to the bottom area, causing burrowed-in shrimp to leap out of the mud where they can be scooped into the net. The type of bottom preferred by pink shrimp does not seem to conduct electricity as well as the mud bottom favored by brown shrimp. White shrimp, apparently non-burrowers, are not affected at all.

A modified "universal" trawl, developed by the BCF exploratory fishing base in Seattle, was designed for use both in midwater and on the ocean bottom. In experimental fishing, the trawl not only proved easier to operate, but brought in catches twice the size of those taken with conventional gear.

Statistics Provide Important Clues

Economics and statistics, dull enough subjects in the average citizen's book, become vital weapons in the struggle for meaningful conservation.

The year's fishery statistics, checked, checked again, and rechecked, provide a first clue to the health of the industry. But while statistics keep the score to determine the status of the industry, they also serve as raw material for important analyses. These analyses, in turn, yield vital information on basic causes and remedies for fishery problems.

The harvest of a particular species may show a considerable drop below the level of the previous year: does this mean there are fewer fish in the sea — and if so, why? Over-harvesting of the species? A change in migration routes? Some mysterious marine disease organism or predator? The destruction of the estuarine nursery-grounds? Thermal pollution of streams that cooks the eggs or kills the young of anadromous fish?

Or is the answer simply biological fluctuation — the mysterious rise and fall in fish populations that puzzles biologists and intermittently drops the bottom out of the Alaskan salmon fishery?

Or perhaps fewer fishermen are making fewer trips. Decreased fishing activity may in turn be influenced by the high cost of labor and equipment, foreign competition, low prices for the catch, a manpower shortage, or the reluctance of the fishing fleet to follow the migration of fish schools into strange or distant waters.

In an effort to ease these hardships, the Bureau administers several financial aid programs to encourage expansion and improvement of the fishing fleet.

The academic law of "publish or perish" is not restricted to the university campus; it holds doubly true in marine conservation. Failure to share findings and discoveries can result in needless and expensive duplication of research, in the ignorant destruction of irreplaceable resources, or in costly failure to implement improved methods of harvesting or processing.

Printed Word Covers Waterfront

Attempting to minimize the unavoidable "information lag," the bureau produces large quantities of printed material each year — highly technical reports in the specialized language of the oceanographer or the biologist; leaflets designed to introduce the grammar school student to the wonderful world of the dolphin and the whale; recipe booklets to encourage the use of fish as an attractive, nutritious, and versatile food commodity.

One of the more outstanding publication achievements is the bureau's comprehensive oceanographic atlas of the Pacific Ocean. Data collected over a 50-year period by 28 laboratories and institutions of 10 nations were assembled, summarized, analyzed and charted. Using high-speed electronic computers, some 3 million measurements of temperature, salinity, dissolved oxygen, and depth, were reduced to 156 charts and graphs for a single compact volume — an indispensable tool in utilizing the ocean's resources.

The atlas required five man-years of work — compared to 50 or 60 man-years that would have been necessary without automatic data processing.

Not the least of the bureau's educational effort is in the form of replies to individual queries.

A Congressman requests an answer to a constituent's question, or background information for a speech. A school child writes an admirably succinct order for "any and all information on the ocean. I need it for a term paper, so please send it as soon as you can." Or an adventurous adult cautiously writes to ascertain whether a particular species of puffer fish can be eaten with impunity, and receives the unreassuring reply that scientific thought is divided on this point. Other queries bear foreign postmarks — a Latin American fisherman wants information on a particular type of lobster trap, or a German student at work on a dissertation seeks a clue to the role of Alaska in supplying the world's protein demand.

Fish with an International Flavor

In foreign relations, the dining table is often as vital a weapon as the conference table. The whole country knows the story of how fish protein concentrate has been developed to offer hope of a dramatic victory in the war on hunger. Less well known are the hundreds of small incidents throughout the year — bits of fallout from conservation research that help cement international friendship in an intensely practical fashion.

A fisherman's cooperative in Montijo, Panama, found itself in a losing struggle to utilize local resources; the fish were there, but the nets and other equipment were

lacking. Then a 700-pound surprise package arrived in the village. A BCF official stationed in Arkansas had arranged for the release of a surplus farm pond haul seine to the Peace Corps, and the Panamanian fishermen reported that the net had increased their catches by as much as 40 percent.

BCF laboratories play host to a steady stream of international visitors — some, specialists and scholars who stay only briefly to observe practices in fish culture; others, to be briefed on new research techniques, or to work with their American counterparts in special projects.

Federal funds made available through the Commercial Fisheries Research and Development Act are used to offset the impact of resource disasters. In 1965, when Hurricane Betsy slammed into the Louisiana coastline, valuable oyster grounds suffered an estimated 50 percent destruction as layers of silt, grass, and other debris stacked up.

Resource disaster funds, supplemented by state money, were used to plant 36,000 cubic yards of shell on 1,100 acres of public oyster grounds, providing a suitable bottom for the setting of oyster larvae.

Although disaster funds are generally used to start short-term emergency programs, a two-year project was required to salvage a valuable seed oyster industry in southern New England and New York. For several years, production had declined from a combination of natural and undetermined causes. Finally, in 1965, for the first time in the 85-year history of the industry, there was no natural set of seed oysters.

Funds were made available to the state of Connecticut, and a cooperative Federal-state-industry program was launched. The following year saw the first general commercial set on these oyster grounds since 1958.

R&D Program Widely Applied

Other projects have led to development of a new fish pepperoni and a fish sausage, both from under-utilized Pacific Northwest shad and rockfish — and both accepted enthusiastically at an international trade fair in Germany, a country where sausage is a serious business.

These are only a few of the programs being carried out with Research and Development Act funds as state and Federal fishery agencies work together for development of new resources and more effective use of those already established.

Federal legislation also authorizes research to improve anadromous fisheries, and make possible numerous studies on such topics as migratory behavior, forecast of timing and size of runs, hatchery construction and improvement, artificial propagation, nutrition, and disease.

Since 1949, BCF has worked with Washington, Oregon, and Idaho in a program to alleviate damage to salmon and steelhead fisheries caused by water-use development projects in the Columbia River Basin. The program includes cooperative construction of fishways around natural obstructions, improvement of the remaining natural environment, and screening of irrigation diversions.

Preservation of the Alaskan fur seals of the Pribilof Islands, in the Bering Sea, is one of the success stories of conservation. Severely depleted by indiscriminate slaughter at the time of the first seal census in 1912, the herds have since made a spectacular comeback under international protection and control.

Only a limited food supply is available to the nursing mothers during the summer, and to the pups during the first months at sea in the fall; this makes careful management of herd population doubly necessary to prevent malnutrition or starvation. The problem is further aggravated by limited rookery space; over-crowding puts the pups in danger of being trampled to death.

During the past two years, BCF and the Coast Guard have jointly covered more than 5,000 miles of high-seas fish patrol by air. Surveillance flights help enforce not only the seal harvesting regulations, but also both domestic law and international agreements protecting such species as salmon, yellowfin tuna, halibut, king crabs, and whales.

Unloved Alewives Present Problem

Generally, a conservation program focuses on the prevention of shortages; however, the Great Lakes alewives represent an embarrassment of riches. This deplorably prolific fish creates hate and discontent by crowding out higher priced, more desirable species. Disenchantment prevails among both area residents and would-be tourists each year when some mysterious factor triggers the massive "die-offs," and dead fish by hundreds of thousands are washed ashore, fouling beaches, and clogging municipal and industrial water intakes (Still, let it be said in favor of this ill-favored fish that it does provide excellent forage for Coho salmon and lake trout that can now develop because of the Bureau's success in controlling the sea lamprey).

The magic of technological ingenuity may have solved a part of the problem. With funds made available by the Federal Water Pollution Control Administration, BCF in 1968 joined in a cooperative effort with state agencies and local industries. Commercial fishing trawlers were used to skim the dead alewives from the lake surface and transfer them to landfill areas provided by industry.

Meanwhile, scientists continued to probe cause and effect, seeking methods to control the alewife population and restore a favorable balance of species in the Great Lakes.

And so the slow work of grassroots conservation goes on . . . discovery, utilization, preservation, education . . . unmasking biological secrets . . . mapping the mountains and meadows of the ocean floor . . . devising better ways to catch or cook fish . . . answering questions for commercial fishermen, housewives, or school children . . . weeding out predatory species . . . slowly, carefully, steadily extending our claim to that area described by President Johnson as the "unknown world at our doorstep . . . our last frontier here on earth . . . the sea around us."

Bureau of Sport Fisheries and Wildlife

Nothing is more powerful than an idea whose time has come, Victor Hugo wrote, and the Bureau of Sport Fisheries and Wildlife (BSFW) believes the time has come for the idea of conservation.

The growing public attention toward conserving wildlife, not only rare species but all animals, involves many individuals and organizations . . . and as the introduction to this yearbook points out, "one simple act of conservation, multiplied by millions, makes a Great Environment."

People have both inspired and responded to Bureau programs; BSFW is an "ally in a cause."

What follows are some conservation "dramas" — where Interior has interacted with people to preserve precious land for wildlife, to save an animal threatened with extinction, to enhance the environment.

One urgent need in the coming decades is to retain a livable America, despite the tremendous concentration of people in urban areas.

BSFW took up this challenge in 1968. In the fall, it held its first symposium on "Man and Nature in the City," a conference attended by experts from many disciplines, including urban sociologists, population experts, and wildlife ecologists. "We attempted to lay a philosophical foundation for the kind of programs we should be initiating in the near future," a BSFW official explained.

The wildlife symposium dealt with questions such as: What are the antagonisms between the urban environment and wildlife? How important is the presence of wildlife to the mental health and well-being of city inhabitants? How much are city dwellers interested in wildlife?

The policies of the future will be based on answers to questions like these. Already there are indications that the people are becoming aroused to the need to preserve areas of solitude amidst surrounding urban congestion.

The story of the Great Swamp in New Jersey is one of the finest examples. Secretary Udall has called the effort to set up a national wildlife refuge only 25 miles from Manhattan "the best demonstration of government and public cooperation" he has seen.

Conservationists united to thwart the interests of organizations that would have flooded the swamp and of others that would have drained it. The battle began in 1959 when word leaked out that this ecological wonderland might become a jetport.

The late M. Hartley Dodge, chairman of the Remington Arms Co., put up the first money — $300,000 — to buy swamp property. This was the beginning of a gigantic campaign. From 6,000 people and 462 groups came $1.2 million to purchase 2,680 of Great Swamp's 6,000 acres. The Bureau is purchasing an additional 3,267 acres.

Local residents formed the Jersey Jetsite Association to prevent the jetport. Untiring efforts were made by Mrs. Helen Fenske and the North Jersey Conservation Foundation. Considerable support came from the North American Wildlife Foundation, which donated the Dodge land to the Bureau.

The result is that the Great Swamp is now a national wildlife refuge immune from the noise and exhaust of jet takeoffs and landings. It is a scenic treasure in the midst of megalopolis and will have a leading role in conservation education.

The Great Swamp has been called a "three dimensional living classroom." Three area colleges — Drew, Fairleigh-Dickinson, and St. Elizabeth's — are using it for off-campus instruction and study. Comprehensive kindergarten through high school conservation education programs are beginning in nearby schools. A nature center was built next to the refuge by the Morris County Park Commission.

A visitor's center with wildlife exhibits will be a feature of the Bureau's educational program. Here motion pictures and slide talks will be presented and guided tours conducted over nature trails. Photographic blinds are to be included. A wildlife observation center was donated by the Summit and Somerset Hills garden clubs. More than a million persons a year are expected to visit the Great Swamp.

This spring about 1,000 persons at Morristown, N. J., saw the premiere of the National Educational Television's motion picture, "The Great Swamp," itself a fine example of cooperation in the conservation cause. The Bureau, together with Remington Arms and Winchester-Western, financed the film.

BSFW acquired a third wildlife refuge on Long Island

during the past year because of a generous 80-acre land donation by Mr. and Mrs. Ferdinand Eberstadt. The Bureau plans a conservation education center on this area only 20 miles east of Times Square.

But the megalopolis stretching from Boston to Washington is not the only area where conservationists have found cause for common action. Residents of Fairbanks, Alaska, didn't realize how much they appreciated nearby countryside until they discovered that it might succumb to a housing development.

Finally, with sale of the land imminent, the Alaska Conservation Society volunteered to put on a drive to raise funds for an option on the property. The campaign brought in $6,800 in private donations, gifts from school children, and proceeds from cookie sales by youth organizations. It was more than enough to win the backing of the state legislature. The area has become the Fairbanks Wildlife Area and Nature Center.

Urban areas, however, do not provide all the spectacular examples of conservationists at work. Land on the Okefenokee National Wildlife Refuge in rural Georgia was preserved because the citizens of Waycross, Ga., became aroused at the senseless slaughter of game. A newspaper and Chamber of Commerce campaign raised $100,000 for the state to lease back additional land. Okefenokee is one of the few genuine swamp areas in the United States and one of the last remaining natural habitats for the alligator—a creature threatened with extinction.

In Wisconsin, Louis Radke, a national director of the Izaak Walton League, fought a seesaw battle with support from other groups like the Milwaukee Federation of Women's Clubs through 16 sessions of the state legislature to preserve the Horicon marsh as a permanent refuge.

Many other refuge lands have come about because of citizen action in recent years. Examples are Cedar Point National Wildlife Refuge in Ohio, donated by a gun club; Brigantine National Wildlife Refuge in New Jersey, held for the Bureau by the Philadelphia Conservationists; Great Meadows National Wildlife Refuge in Massachusetts, supported by the Massachusetts Audubon Society and the League of Women Voters; and San Luis National Wildlife Refuge in California, dedicated in 1968.

The San Luis story won the 1967 American Motors Conservation Award for Alvaro D. Sousa, owner of Agricultural Minerals and Fertilizer Co., who headed the drive which made it possible for the Bureau to acquire the refuge located near Los Banos.

Tours were conducted over the area participated in by chapters of the Audubon Society, Sierra Club, Nature Conservancy, Historical Society, and many civic and educational groups. A short film on the egret-heron rookery was shown throughout the valley.

Conservationists united to win a major decision early in 1968 that prevented a corporation from acquiring waterbottoms for purposes that would have destroyed fish and wildlife within the Great White Heron Refuge on the Florida Keys.

The Bureau has received the greatest cooperation in its program to protect species threatened with extinction. Efforts to save the whooping crane, bald eagle, and other animals have captured the public's imagination. A growing number of organizations is joining in research upon and management of threatened species. Other groups have donated land for habitat preservation for these valuable species.

America's Newsworthiest Bird

Wildlife lovers everywhere follow the annual story of the whooping crane. A year ago, a record 48 whoopers landed at Aransas National Wildlife Refuge in Texas for the winter. The whoopers are perhaps man's greatest conservation story.

Let anything happen to one of these rare birds and it becomes a national news story. Such wide public attention has helped researchers learn more about the migratory habits of this tallest bird of North America. Public sightings are quickly reported to authorities, and Nebraska hunters voluntarily interrupted their hunting season one year when the birds were seen in that state.

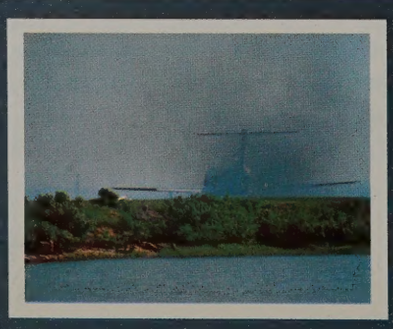
This public awareness probably explains why a high school youth in central Kansas last spring spotted a dead whooper, moved it to the side of the road, and the next day reported the death to his teacher.

The whooper died after striking a nearby power line during a storm. The alert lad enabled biologists at the federal Patuxent, Md. Wildlife Research Center to make a thorough autopsy. The valuable specimen later was placed in the National Museum in Washington, D. C.

This public awareness also explains why Sunray DX Oil Co. voluntarily shut down early two gas wells 2½ miles above Aransas when the whoopers arrived ahead of schedule a year ago. The company hung a sign on the wellhead: "Closed until May 15. This place is for the birds."

The Bureau cooperates with the Canadian Wildlife Service during summer removals of crane eggs from Wood Buffalo National Park near the Arctic Circle. The Canadians search for nests and supervise the egg taking. The eggs are hatched at the Patuxent, Md., Wildlife Research Center.

The bald eagle, our national bird, also has rightly captured a sizable public concern. This often mistreated



This ladder-back woodpecker believes in signs. Refuges gain importance as jet civilization ruins habitat.

creature already has disappeared from many areas of the country.

Several private timber companies in the past few years have duplicated BSFW's practice of restricting the public from eagles' nest areas. They have been protecting nest trees on their property and are seeing that there is as little disturbance as possible. The Bureau is sending these companies questionnaires so more can be learned about bald eagles. The Red Lake Band of the Chippewa Indian tribe in north central Minnesota has joined the crusade by protecting bald eagles on its 500,000-acre reservation.

Since 1959, BSFW has cooperated with the National Audubon Society in a bald eagle research program. BSFW's role centers on determining the effects of pollutants, especially pesticides.

The Woolgrowers, National Audubon Society, and BSFW have agreed to a joint $28,000 study of golden eagle populations.

Rare Quail to be Reintroduced

One of the greatest cooperative ventures will culminate in 1969 when the Federal government plans to release captive stocks of masked bobwhites in Arizona. Due to devastation of its range by livestock drives, this quail disappeared from its original habitat in the Altar Valley of southern Arizona just after the turn of the century.

About 19 years ago, several masked bobwhites were brought back from Mexico to Arizona for propagation. In 1966, descendants from this stock were donated to the Patuxent Center by James and Seymour Levy of Tucson. From these birds, over 40 young were raised last year.

The Arizona venture has the cooperation of the Arizona Game and Fish Department, the Bureau of Land Management, the Forest Service, and many interested ranchers who will help to fence out livestock. Some of the releases will be made on the Santa Margarita Ranch in Altar Valley owned by Frank McDermand. The area would become a state refuge with hunting forbidden.

Some of the News Is Good

The Key deer story is one of the most heartwarming in conservation annals. The fire of public spirit was kindled in the late 1940's when the herd in Florida declined to 35 deer. The organizations that helped make the Key deer a celebrity by contributing cash and land are too numerous to mention separately, but this tiny animal now numbers over 400 on the National Key Deer Refuge on the Florida Keys.

Brown pelicans have almost disappeared from Louisiana, where they are the state bird. Many of the birds remain in Florida, a few in South Carolina, and conservationists hope they can be restored to former areas. BSFW is now studying brown pelicans in cooperation with several of the Southeastern States, the Welder Wildlife Foundation of Sinton, Tex., and the National Audubon Society.

The California condor is another endangered bird — fewer than 50 remain. Since 1965, the National Audubon Society, the California Department of Fish and Game, the U.S. Forest Service, and BSFW have cooperated in intensive studies of this species. Over 100 private individuals have helped count this scarce bird during a two-day annual survey. Ranchers having condors on their land have been sympathetic to the need to preserve these birds and have permitted use of their land for research.

Two South Dakota ranchers, Earl Adrian and James Carr, whose properties are home for families of endangered black-footed ferrets, provide an outstanding example of voluntary cooperation for conservation. They are permitting prairie dogs, which can ruin good grazing land, to occupy their properties because they help ferrets survive.

Habitat Preservation Helps

Land acquisitions and donations also figure prominently in endangered species protection. One of the most successful stories is occurring at Mason Neck, Va., a bald eagle habitat only 18 miles from Washington, D.C. The Nature Conservancy, a 12,000-member nonprofit corporation dedicated to preserving natural areas, has been buying land from private owners along the Potomac River to thwart developers who have ambitions to see a small city there.

The State of Virginia and the Northern Virginia Regional Park Authority are purchasing most of Mason Neck from the Conservancy and other owners. BSFW hopes to purchase a 950-acre refuge there. This would place all eagle habitat in the area under public control. Eagles, sometimes as many as four pairs, inhabit Mason Neck the year 'round, with nests located in large areas of unbroken forests. Mason Neck promises to help slow the precipitous decline of the national bird along the Potomac, and the habitat there is also desirable for wild turkeys, pileated woodpeckers, and white-tailed deer.

Last year, Mr. and Mrs. J. Meredith Tatton of Refugio County, Tex., donated a 7,162-acre tract adjoining the Aransas National Wildlife Refuge to the Bureau for preservation of migratory birds. The tract also will benefit Attwater's prairie chicken. A member of the grouse family and a near relative of the heath hen

Be it bird-banding or bird-watching, the BSFW works hard at achieving a happier, better balance of life.

which formerly ranged in New England, Attwater's prairie chicken once flourished in the flat, tall coastal plains of Texas and Louisiana. Millions of the buff-colored birds once filled the air with their resonant booming and performed their strange, spectacular courtship dance. Now only about 1,000 remain.

A few years ago, the World Wildlife Fund bought 3,800 acres of prime chicken habitat near Eagle Lake east of Houston.

The Texas Chapter of the Nature Conservancy has acquired Ezell's Cave in Hays County, Tex., to preserve the only known habitat of a rare blind salamander.

Iranian Import Proves Success

Another "everyone in the act" success story involves the introduction of the Iranian white-winged pheasant into New Mexico. Iran permitted the Bureau to trap a few of these pheasants under the foreign game bird importation program. Then the State of New Mexico bought a few from the Bureau for propagation. The first release was made in the southwest corner of the state about four years ago; the birds immediately thrived.

In 1966 the state had its first public hunt, and since then transplants, with the assistance of Federal aid funds, have been made in other parts of the state as far north as Albuquerque.

A fishing "spectacular" is occurring on Lake Michigan with coho salmon. The Michigan Department of Conservation obtained over a million coho eggs from Oregon, Washington, and Alaska for hatching in Michigan hatcheries. About 4 million coho smolts have been stocked in tributaries of lakes Michigan, Superior, and Huron in this highly successful experiment.

As a result, sport fishermen, who had lean seasons after the sea lamprey almost wiped out lake trout, have had field days angling for the gamest of all Pacific salmon. Tom McNally of the Chicago Tribune wrote: "This is fishing for the poor guy and the rich guy, for men, women and children — everybody. People who have not fished in years now are catching coho salmon."

Federal money under the Anadromous Fish Act of 1965 has supplied nearly $1 million for the coho project.

Fish for stocking Indian reservation waters are provided by 20 national fish hatcheries. The White Mountain Apaches' reservation in Arizona is a prime example of how sport fishing combined with other recreational facilities can pay off economically.

Cooperation Pays Waterfowl Dividends

The Garrison Diversion Unit, a gigantic irrigation project in the Dakotas, is paying waterfowl dividends because of the cooperation of BSFW, State fish and game agencies, the Bureau of Reclamation, and national and local conservation organizations.

As a result, about 100,000 acres will be added to the refuge system. This will permit development of 26 major units and several smaller ones for waterfowl production in the nation's Midwest "duck factory." An additional 39,000 acres will be made available to Dakota fish and game agencies for development of waterfowl, upland game, and fishing. An annual full duck crop can be produced with an assured water supply during dry years. Big game, upland game, and waterfowl hunting will increase, and there will be protected habitat for many non-game species.

The story of grassroots conservation would not be complete without mentioning public cooperation in bird banding and fish tagging programs. More than 1.5 million birds now are banded annually in a practice begun in the 1920's, and last year a record 100,000 of these identification bands were returned from outdoorsmen all over the continent. The Bureau switched to a computer in sending out replies to curious sportsmen who want to know, just like the Bureau, the migration history of the birds they have killed or captured.

BSFW also tags game fish to learn about their migrations. In the Atlantic, 15,500 bluefish, marlin, sailfish, and giant bluefin tunas and 5,000 sharks have been tagged. More than 8,800 striped marlins and a few related species have been tagged by Pacific anglers. Many of the recaptures have been by commercial longline fishermen — some of them over 2,000 miles away.

One of the leaders in grassroots conservation is Dr. Paul H. Fluck, who has lectured to over 400,000 persons at the Washington Crossing Nature Conservation Center in Pennsylvania. In February 1968, he was presented the Interior Department's Conservation Service Award. In a letter announcing the award, Secretary Udall wrote: "The message you have so effectively delivered . . . has increased the interest and participation of thousands of people working toward better wildlife management."

Miss Rita Martin, an elementary school teacher in New Richmond, Ohio, makes National Wildlife Week the major event of the year for her students, who read nature books and play games she has devised concerning wildlife.

The Fergus Falls Junior College Circle K Club in Minnesota donated over 100 man hours replacing damaged signs on BSFW waterfowl production areas. Anti-poverty community action program workers helped clean up waterfowl areas in South Dakota.

Last year Mr. and Mrs. Eligeo Del Guercio of Florida donated a high-powered, air-conditioned $40,000 boat to the Bureau with the stipulation that it be used for "marine game fish research." BSFW renamed the boat the "Rachel Carson" and assigned it to the specified research.

These are all examples of the "grassroots" approach to conservation — examples where the public has helped reverse the tide of degradation of the natural environment.

The problems are far from solved, but the conservation movement is gaining impetus. Citizen action is helping to stir up the most powerful force of all in a democracy — public opinion. To paraphrase Victor Hugo: The time for the idea has come.

Land Resources

"What military laurels won in battle can compensate a nation where there is no space for mankind to walk through a forest, park or museum, where cities have no water, or where earth has died from lack of care?

"If our stewardship does not preclude these possibilities, the latter part of this century will be a monument to our lack of vision."

Congresswoman Julia Butler Hansen
Washington

Land Resources

A lone firefighter, a group of public land reviewers, all contribute in their separate ways to the national pool of good stewardship — our nation's most basic natural resource.

Bureau of Land Management

Not his dreams, not his words, not his noble planning, but what he finally does with the land will be the deciding factor in man's survival. For the land is his foundation; all that he builds is built on the land and from the land.

At our Nation's birth most of what makes up its present area was unsettled. As each new land mass was acquired it was first considered common property — a public domain.

The backbone and spirit of our developing nation was the soil and those who worked the soil. A hunger for land characterized our pioneer generations. As the farm lands in the East were completely occupied, callous-handed farmers turned to the Western public domain, where they could claim virgin sod for their plows to turn. Development was the byword of the era; "breaking new ground" was a noble enterprise. Following the new ground, they migrated to Ohio and Illinois to plant fields of corn, they furrowed Kansas, and went on to sow fields of amber grain across the Dakotas. They trekked to Oregon to settle the Willamette Valley and climbed across the Sierra Nevada to plant vineyards in California.

Wherever there was water and arable soil they plowed, sowed, and harvested. Along with their corn, wheat, tobacco, and cotton they raised sons and daughters and the sons and daughters inherited the land from their fathers and passed it on to their children. With plow and sickle, tractor and combine, they laid the foundation of the United States of America and all else was built upon that foundation.

In time most of the arable land from the Atlantic to the Pacific Ocean was blocked into farms. Eventually, all that remained was the picked-over, the bypassed, or the land that was too dry, too steep, or so infertile that

it could not be persuaded to yield a crop. This land, to an agricultural generation, was wasteland; some said it was there only to hold the world together. It remained in the public domain.

In 1968, American citizens still jointly own more than 450 million acres of public domain, including areas extremely rich in oil shale. All this is administered by the Bureau of Land Management (BLM) and is apart from other public land reserved for national parks, national forests, and national wildlife refuges. No longer is it considered wasteland, for our growing population has need of every parcel of our real estate. With growth, our uses for the products of the land have increased and new kinds of needs have developed.

The injunction that man shall not live by bread alone does not diminish the need for bread; instead it focuses attention on the wider vistas of the human spirit. While we ask our land for more wheat or more beef, we also look to the land for recreation and open space, wide enough for us to stretch our spirits. The remaining public domain is our last frontier — our last room for roaming — our last chance to preserve some vestige of the rugged outdoor image of our fathers.

Public Guidelines Sought

As the public's steward for more than 450 million acres of public land, the Bureau of Land Management must account to the people, and as a matter of agency policy it seeks guidance in its management and planning. In 1954, Congress advised the Bureau to carry out the classification of public lands with public guidelines. The Bureau since has held scores of public hearings on classification matters and has worked with state and local officials in all phases of the classification process.

Advisory boards, composed of local citizens representing a wide variety of interests, have long played a part in the Bureau's policy-making function for both forest and grassland management at district, state, and national levels.

Grassroots conservation has a dual connotation for BLM:

First, there is the grassroots participation in planning and policy by all interested people. The voice of the cowman in Wyoming is part of the chorus of opinion that includes the plumber in Boca Raton, Fla., and the barber in Bend, Ore. Planning and policy decisions consider the petitions of bird watchers and rockhounds along with those of industrial corporations and bank presidents.

Second, there is grassroots management of the land. This may involve planting a Douglas fir seedling on a Cascade slope in Oregon or a grass sprig to stabilize a sand dune in New Mexico. The jobs are as simple and as complex as the whole panorama of American know-how and technology. Management can mean an aching back bent to weed a nursery or a helicopter hovering to fix a survey marker with the aid of electronic computation. It is as dramatic as an Apache parachuting down to fight a fire on the Alaska tundra and as mundane as a Job Corpsman stringing barbed wire across the Arizona desert. To BLM, grassroots conservation is more than a figure of speech. It involves real roots and real grass.

Vegetation is the basic range resource which lends value to other rangeland features. Range flora provides beauty to the landscape and to recreation sites; it furnishes food for domestic livestock, big-game animals, and upland game birds; it provides a "home" for all wildlife species; it protects the land from the impact of raindrops and holds the soil in place, preventing erosion, siltation, and flood damage.

Grazing by domestic livestock is the most dominant force affecting vegetation on non-forested lands. Therefore, planned grazing management to improve and maintain the vegetative resource over large areas is the most efficient and economical means of supplementing watershed, wildlife, and aesthetic values. Planned grazing management provides economic stability to the livestock operator and, in the aggregate, contributes to the local economy of many western communities.

The Bureau has started a program of more intensive management. Several hundred grazing management plans have been applied on the public lands since the program began. Land resource conservation requirements are being fulfilled, resulting in better vegetative cover for the watershed, improved wildlife habitat, and other values. In addition, ranchers are benefiting in terms of better calf crops and higher weaning weights. In one instance, gross income of a rancher doubled in 4 years because of improved grazing management. The stocking rate has been increased on many public land allotments as the vegetation improved.

The program of grazing management planning is fully oriented to the needs of people. A progressive program requires frequent contact with the concerned public. Grazing management training sessions conducted throughout the West have attracted professional resource technicians from many Federal and state agencies but, more important, the ranching industry and other user groups are participating in these training sessions.

The roots of forest trees spread wide and deep in good soils. Western Oregon has such soils; they support some of the world's most productive and valuable forests, composed of the Douglas fir and its associates. Here, the grassroots of public support and cooperation are equally as deep and wide reaching.

Forestry Partnership Pays Off

BLM's forest management responsibility encompasses some 150 million acres of public forest and woodlands scattered across the western portion of the North American continent from the remote spruce-birch timber line of interior Alaska to the ponderosa pine on the Black Hills of South Dakota. However, it is on a relatively narrow two-million-acre strip of the Douglas-fir region in western Oregon that the Bureau's most intensive forest management efforts are focused. Here, BLM carries out its assignments under the farsighted O&C Sustained Yield-Multiple Use Act.

Under this act, BLM has followed over 30 years the practice of developing its policies and plans with the advice of the O&C counties, conservation groups, and the public. This partnership with the people of Oregon has resulted in solid support of sustained yield forest management principles tempered by the need to provide other beneficial returns through multiple-use management.

Six public advisory boards contribute to BLM's resource management efforts in western Oregon. Five are local groups advising each of the western Oregon district managers; one encompasses the overall "west-side" program and meets periodically with the BLM Oregon State director and his staff. These boards range in size from 10 to 18 members and include representatives of wood-using industries, private foresters, state resource officials, educators, labor leaders, recreationists, newspaper editors, and others from the public at large. They all share common qualifications: a strong interest in public resource management, intimate knowledge of their communities, and facility for rational, critical thinking.

During 1966 and 1967 a committee of the O&C Advisory Board carried out and published an in-depth study on allowable timber-cut policy issues and influences in western Oregon. The final product now is being used by a BLM team for consideration in developing BLM allowable cut policies for the next 10 years. Western Oregon counties return a third of their share of O&C timber receipts to BLM for construction of forest roads, reforestation, recreation, and other forest investments.

Fire Salvage Wins LBJ Citation

The Oxbow fire of August 1966 burned 46,000 acres of productive timber land in Oregon, over half of it BLM lands. Firefighting efforts were immediate, massive, and highly cooperative. On the fire lines were teams from private industry, logging operations, BLM, Forest Service, and the State of Oregon.

Rapid salvage of over 500 million board feet of fire-damaged timber was made possible by local loggers. Reforestation, soil protection, and clearing of miles of debris-choked streams resulted from close cooperation involving university and fish and game experts. The job won the only Presidential Citation awarded by Lyndon B. Johnson in 1967.

The public lands represent the greatest undeveloped potential for wildlife and fish production in the West. Over 160 million acres of important wildlife habitat, 132 thousand miles of streams, and several million acres of lakes and reservoirs have been identified, but most are suffering from many years of neglect.

Because state wildlife agencies are primarily responsible for administering the public use of wild animals, while the Bureau has the primary responsibility for their habitat on the public lands, teamwork is essential. Relationships are excellent. On lands classified for retention by the Federal Government the states are beginning to make substantial investments in habitat improvement through cooperative projects with the Bureau. The Bureau also looks to the states for assistance in developing management plans for critical wildlife habitat.

Many forms of wildlife are found on the public lands, including 85 important game and fish species and more than 50 rare, endangered, and peripheral species which will require special management of their habitat if they are to survive.

Public land streams provide over half the total spawn of salmon and steelhead in the West. The 2.7 million big-game animals that use these lands comprise nearly 20 percent of the total big-game population of the United States. Virtually all of the caribou, brown and grizzly bears, Dall and desert bighorn sheep, 80 percent of the moose, 65 percent of the mule deer, and 45 percent of the antelope in the United States depend upon the public lands for all or part of their yearlong habitat requirement.

Wild Horses to Roam

The Bureau has taken a first step toward settling the long-standing wild horse and burro problem on the public lands. Unbranded and unclaimed horses or burros are to be maintained as an important resource in areas where their aesthetic value is significant. Management plans, including cooperative agreements, will be required, as well as assistance from interested groups to aid in the identification of potential areas for maintaining wild horses and burros and in their management and control.

The past year marked several firsts in BLM's recreation program. Initial steps in master planning began with a pattern for Red Rock Canyon Recreation Lands near Las Vegas, Nev. Concepts for additional significant locations are taking shape — forerunners to planning for other recreation lands in the hundreds of millions of acres in the public domain.

The master plan for the 70,000-acre Red Rock area provides for interpretative facilities and a visitor center, 500 family units in camp sites, 610 picnic units, two group picnic sites, and eight group camping areas. In addition, 45 miles of trails and 39 miles of scenic roads will serve these sites. A "research natural area" of 200 acres also is in the plan.

Another important first was the construction of protective facilities on almost 1,000 acres in the Desert Lily and Wildflower Natural Area in southern California. This site contains a myriad collection of desert flowers. In addition to the lillies, several varieties of primroses and other species are represented. Over the years, its beauty will be viewed by many thousands of urban dwellers from the Los Angeles area. At the same time, the area will be a research center for desert vegetation studies by botanists and ecologists. This is a start on protection projects for many of the more than 130 proposed natural areas under BLM management.

Beginnings of a new trail system on the public domain were in evidence last year, in scattered locations. All trails developed until the present are short ones connecting public domain with highways, state parks, or national forests. An unusual first in trail development

occurred in 1967 when BLM Job Corpsmen from the Tillamook Center built a series of short trails for fishermen along the Wilson and Nehalem Rivers in northwestern Oregon. An extensive network connecting with many national forest and park trails is envisioned for future years.

Publications Serve Sportsmen

Progress in guiding recreationists on the public lands moved forward with the 1968 publication of *Room to Roam* with regional maps and listings of many recreation attractions. A further aid is the list of BLM state maps of the public lands which now includes Alaska, Arizona, Colorado, Montana, Nevada, New Mexico, Oregon, and Wyoming. Others are in preparation. These maps are particularly useful to hunters and fishermen.

Much of the area managed by the Bureau of Land Management in the western states is arid or semi-arid, supporting a fragile cover of vegetation which controls the delicate balance between soil stability or deterioration. Almost 100 years of unregulated livestock use, coupled with wildfires and drought, caused severe depletion of the protective cover. Erosion was accelerated. The soil losses caused a decrease in site productivity that cannot be recovered within the next 10 generations or more. Other damages occur from flooding, and the yield of sediment and salts from eroding lands impairs water quality and disrupts streamflow stability.

BLM estimates that 123 million acres of the 175 million acres of public land in the western states are in only fair condition or worse. Of the 123 million acres, 45 million are in a "frail land" category and 20.5 million of these are in a deteriorating trend.

The conservation and development of public land watersheds is a high-priority program needed to: (1) prevent and control non-geologic erosion, (2) enhance off-site values, including improvement in water quality, improved timing and yield of streamflow, renewal of ground water supplies, and the control of floods, and (3) enhance on-site resource use values, including improved fish and wildlife habitat, livestock forage, and outdoor recreation.

Progress at the 1968 fiscal year level of $12,659,500 would require approximately 50 years to accomplish the conservation needs identified in the *1964 Conservation Needs Inventory*. An annual investment of approximately $28 million in watershed conservation and development would be required to satisfy the estimated needs by 1990.

The corrective treatments are aimed primarily at improving vegetative cover. By July 1968, some 234,000 acres were seeded to suitable grass and browse species, 346,000 acres of undesirable brush were controlled, and 84,000 acres received special treatment, such as contour furrowing and pitting.

New Fire-Control System Begun

A five-year fire-control planning system, based on public land resource values, was started by the Bureau of Land Management in 1966. This is proving to be an excellent rationale for reviewing the protection being given lands and other resources under BLM jurisdiction.

The Boise Interagency Fire Center, established in Idaho in 1965 to assure greater fire-control flexibility in combating forest and rangeland fires on all Federal lands throughout the western states, is providing manpower and logistical support when needed. Assistance is given to the Forest Service as well as to several Department of the Interior agencies: Bureau of Land Management, Bureau of Indian Affairs, Bureau of Sport Fisheries and Wildlife, and National Park Service. With the completion of buildings for warehousing, administration, and equipment for mixing and loading fire retardant materials scheduled for 1968, the quality and efficiency of the support by the Fire Center will be further improved.

Activities of the Division of Engineering are geared to the Bureau's effort of restoring, preserving, and maintaining the environmental quality of the 450-million-acre public domain under the concept of multi-use management.

Surveys Being Updated

Since the first section corner of the public land surveys was set more than 180 years ago, over a billion acres of land have been surveyed. The increasing density in population and the ever-increasing uses to which land is being subjected have increased the demand for better and more precise engineering.

The Cadastral Engineering Branch is responsible for the orderly survey of the public lands to show or record property boundaries, subdivision lines, and the quantity of land. The basic rules under which the engineer makes and records his surveys are prescribed by Congress.

The Engineering Division is expanding its survey activities while improving its survey system with new equipment and techniques, such as use of the best electronic measuring devices in combination with the most up-to-date photogrammetric methods, to upgrade the quality and reduce the man-hour costs of a complete survey. BLM survey parties now use small portable field computers as well as the most sophisticated office computers.

Basic to adequate management of the public lands and resources are suitable road systems. Permanent roads, as well as spur roads, are needed for protection, management, and use of our public lands. Sixteen new road projects were undertaken by the Bureau in 1967; some of these are now complete and in use. In 1968, BLM had 38 new road projects under consideration. To satisfy public demand, Bureau engineers must design and provide roads and trails where none now exist.

Numerous campgrounds and all necessary conveniences have been constructed under direction of the Bureau's engineering staff. Many more recreation and camping sites are planned and BLM hopes that most of them can be established.

Proper management of soil and water resources on the public lands requires a wide variety of water control

and development structures, land treatment, and other improvements. Fences, wells, reservoirs, pipeline systems, and spring developments are provided for balanced use of the range by domestic livestock and wildlife. Flood-retarding dams, check dams, diversion structures, and waterspreading systems all fit into the multi-use management concept by checking erosion, protecting downstream property from flooding, increasing forage, providing wildlife habitat and contributing to outdoor recreation. Their design is the responsibility of the Division of Engineering.

The layout and design of camps and facilities for the Job Corps also are functions of the Branch of Design and Construction of the Division of Engineering.

More, faster, and cheaper surveys, as well as more miles of faster and better roads, improved communications, an increase in recreational facilities, and more of all the other services which this Bureau now offers soon will be demanded by our ever-increasing outdoor-conscious population.

BLM, which conducts sales for mineral leasing on the Outer Continental Shelf, found 1968 a record-breaking year, with $1,260 million in bids going to the U. S. Treasury, as shown in the chart *Report to Our Stockholders* elsewhere in this book. Since 1954, mineral leasing — primarily for oil and gas — has brought over $3,000 million in bonus bids and first-year rentals. BLM has agreements with other agencies to protect marine resources from damage in connection with recovery of minerals from the Outer Continental Shelf.

National Park Service

The National Park Service (NPS) and the U.S. Navy joined forces this past year to save an island. Under a plan proposed by NPS, the Navy eliminated 148 destructive sheep from San Miguel Island, a scenic wildlife habitat of 14,000 acres off the California coast.

San Miguel is one of several islands that would be included in an unusual Channel Islands National Park under three bills introduced in the 90th Congress. The island is administered by the Navy and NPS. San Miguel would be used for park purposes when the Navy no longer needs it.

A Park Service biologist observed the Navy's conservation effort. He reported: "The event brought the end of an era: 117 years of continuous grazing on San Miguel, and was a necessary step towards preservation of a unique flora and fauna."

This example of Conservation in Action — right down to the grass roots of San Miguel's original plant cover — first took form in 1966. In June of that year, NPS sent the Navy Department "A Suggested Plan for the Management and Protection of Values of San Miguel Island."

The plan advised that "the most pressing and immediate management and protection need of the Island is total elimination of populations of feral sheep." The NPS biologists said, "The island had suffered the severest consequences from an almost complete destruction of the original flora and subsequent wind and water erosion."

With typical efficiency the Navy quickly completed its mission. But San Miguel is not the only island in the prospective park, or in Channel Islands National Monument, threatened by upset of the ecological balance. Anacapa and Santa Barbara Islands both had suffered from heavy grazing before President Franklin D. Roosevelt set them aside as a national monument in 1938.

Biologists found Channel Islands plant life and wildlife almost destroyed as the result of the introduction of exotic plants and animals, grazing, fire and farming. Since 1938, however, Anacapa has made a remarkable recovery. West Anacapa, in this five-island string, is the luxuriant showcase of a 30-year conservation success story.

Santa Barbara Island was still plagued in 1967-68 by New Zealand rabbits introduced during World War II. The rabbits had reduced the original plant life from shoulder height to knee and ankle height in some places, and to bare ground in others. In October 1967, the biologist took an eradication specialist to Santa Barbara. The specialist, from the U.S. Fish and Wildlife Service, sought to make sure that the rabbits would not hole up in the almost inaccessible ledges of the island's 600-foot cliffs as they had done in previous eradication attempts. The two men scrambled down the cliffs to seal off this escape route. "On the last day," they said, "we saw no live rabbits anywhere."

But, by January 1968 there were "about 100 rabbits hopping over the island," so another eradication campaign was conducted.

Men with ecological knowledge, persistence and courage are mending or restoring landscapes and biological communities damaged by human activity. The task is difficult and complex, as the Channel Islands efforts of NPS, FWS and the U.S. Navy amply proved. A pleasing and healthful environment is not achieved by inertia.

NEED Program Launched

In February 1968, NPS launched a new interpretive program to make park areas more useful to the nation's schools — a program of environmental education which is likely to become one of the most far-reaching of all NPS activities.

This program considers not only the natural scene, but man's place in nature and his effect upon the environment, historically and in the present.

While it is designed primarily to provide a more perceptive understanding of the values to be found in visits to NPS areas, the program will pay additional dividends to the country at large. Environmental awareness is the foundation for safe and attractive hometown environments, for health and more rewarding personal life. Ultimately it may be — as ecologists are warning us — a requirement for the very survival of man.

Planning began in July 1967, and by January 1968

work was under way at the University of California's Davis Campus on a model plan of environmental instruction. Called the National Environmental Education Development (NEED), the plan started with the basic premise that environmental awareness requires not only classroom work but experience out of doors. The national parks have always been a rich resource for such educational experience, but the planners wanted to give it direction by creating programs and interpretive teaching materials keyed to the grade levels of the schools. NEED is keyed to all of the subjects in the curriculum — to art and history, for instance, as well as to natural science.

Still in development, the NEED materials are being created for use by teachers and children at selected Park Service sites, with related materials for use in the classroom before and after the visits. What children learn through NEED will heighten their enjoyment of future National Park visits and create understanding of the importance of careful usage to protect the parks. The materials will be sufficiently flexible to permit adaptation to a variety of sites and widespread use by the educational community.

A sophisticated development of the NPS Interpretive Program, NEED is being designed to provide a continuing series of environmental experiences from the first grade through high school. Materials are being created first for guiding elementary (fifth and sixth grade) students in a park experience which will focus on appreciation of the natural order. In the second phase, seventh and eighth graders will study man's use and abuse of the land, air and water, and what must be done to rectify contaminated environment. The third phase, for the 11th and 12th grades, will stress environmental management and planning. Pilot tryouts of these materials were made in the spring of 1968, with children and their teachers living and learning for a week at five outdoor sites across the nation.

Study Areas Developed

Dovetailed with the NEED program is another new NPS interpretive educational move — the establishment of 27 Environmental Study Areas on NPS properties in the populous East Coast states, plus Tennessee, West Virginia, the District of Columbia and Puerto Rico. These areas, for use by school groups, were selected not only for their natural science values but because they also show the effect of man upon the environment. Interpretive teaching material specifically related to each study area will be developed cooperatively by the local schools, NPS naturalists and the NEED staff of educational specialists.

Those NPS areas that already were stressing youth education are fertile ground for the new environmental education programs. Chesapeake and Ohio Canal National Monument in Maryland and West Virginia, bolstered the Head Start, Catch Up, and Operation Opportunity programs of the local schools and conducted nine field trips with 477 student and teacher participants. Campouts and field trips for a church camp and a Y.M.C.A. day camp brought 673 more youngsters into the conservation orbit.

In November, C & O Canal National Monument resumed the "Day in the Park" program it had conducted the previous school year. This program calls for a Park Ranger to visit the classroom, give a talk and show a movie about the Canal. The class then takes a field trip along a selected segment of the historic waterway. In November and December, the park conducted field trips for 1,300 fifth graders and teachers of the Frederick and Washington County schools, Maryland.

In its emphasis on urban areas, NPS can produce convincing credentials. It has been administering areas for many years in a dozen urban centers, including New York, Philadelphia, Washington, St. Louis, New Orleans, Richmond, and Chattanooga. It has opened a Boston City Group office and recently has been authorized by Congress to administer areas in Buffalo, N.Y.; El Paso, Tex.; Brookline, Mass.; Johnstown, Pa.; and Vincennes, Ind. No other government instrumentality on any level administers as many diverse urban area parks.

'Summer in the Parks' Started

To keep pace with its snowballing urban responsibilities, NPS was reinforced with a deputy associate directorship for urban affairs late in 1967. One of the first objectives of the new office was a "Summer in the Parks" program for Washington, D.C. NPS earmarked $575,000 to get people out of the urban pressure cooker and into "Summer in the Parks." Working closely with the District of Columbia government, the Park Service designed a three-part plan to brighten the city and provide the people with a variety of diversions and recreation.

The program called for:

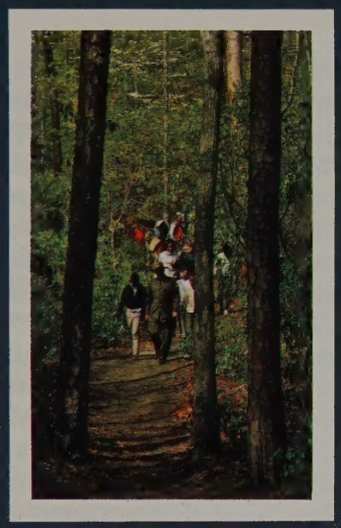
—"Surprise" bus excursions to take city children to different parks in the District, Maryland, and Virginia each day of the week;

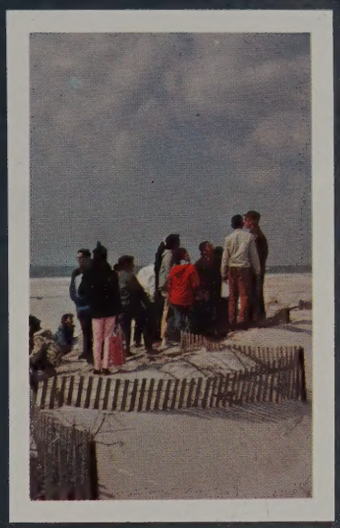
—A wide variety of portable equipment to be made available to any neighborhood selecting a "community park" and ready to present community entertainment and cultural programs;

—Imaginative use of inner city parks, including cultural events and exhibitions by the Smithsonian Institution; traveling show units, and festive devices.

NPS blossoms and bulbs provided a lively background for "Summer in the Parks." Private donations to the First Lady's Society for a More Beautiful National Capital, Inc., passed the $2 million mark in December 1967. Grassroots conservation is more than a figure of speech with NPS; it is a year-round specialty. For many spring blossoms, autumn is the time to set out plants. Park Service gardeners set out 470,000 of them in 1967, planted 150,000 annuals, and furnished 90 schools with 75,000 bulbs and chrysanthemums to provide permanent seasonal color displays.

Congress entrusted NPS with another major responsibility when it approved an act to convert Washington's Union Station into a National Visitor Center. Congress





It's a whole new world. These 5th and 6th graders from schools in Washington, D. C., and the Bronx, N. Y., are meeting their planet on down-to-earth terms in a five-day camping experience at Prince William Forest Park in Triangle, Va., (photos at left and center) and at Fire Island National Seashore in New York. Each youngster stakes out his own "private property" at the beginning of the Park Service NEED sessions and uses it during the daily "quiet hour" to paint, write, take photographs, or conduct a natural science project . . . on his own. The not-so-quiet hours are filled with learning sessions, formal and informal.

Prince William Forest Park photos by Patricia Caulfield

authorized $16 million worth of improvements for the white marble and granite station. Its 53-foot-high grand concourse, one of the world's largest rooms, will become a grand hospitality center to help welcome the Capital's 10 million visitors per year.

On the other side of the continent, NPS grappled with a less familiar and more complex problem. From September to February, 323 strong sonic booms resounded over the rugged desert country of Death Valley National Monument in California and Nevada. The complex problem of sonic booms, caused by aircraft penetrating the sound barrier, is a relatively new environmental intrusion. Sonic boom analysis is still in the pioneering stage. Sixty-eight of Death Valley's "thunderclaps" were classed as severe—which means they annoyed residents, rattled windows, and shook buildings. They also shook NPS into setting up a detection system for gathering information on sonic booms and low-flying aircraft disturbances. NPS is now compiling reliable and documented data for presentation to the Federal Aviation Administration and the Department of Defense.

Sonic booms, and related aircraft noise disturbance, had shaken many areas of the National Park System. Some parks, such as Canyon de Chelly National Monument in Arizona, reported damage to natural features and prehistoric Indian ruins. The damage occurred, whether by coincidence or not, on the passage of high-speed planes followed by a thunderclap sound in clear weather. In some instances the cause-and-effect relationship between the damage and the occurrence of sonic booms could not reasonably be challenged. Yet legally most of the evidence was circumstantial.

Thus the systematic and extensive collection of data was begun. The data are duly summarized, interpreted, and evaluated. Now NPS is better prepared to present a strong case aimed at preventing the rash of sonic booms from becoming an epidemic of critical and damaging proportions.

Grassroots conservation today extends from the stratosphere to the desert to the atom. While recording sonic booms, NPS keeps an equally watchful eye on nuclear power sites which might be located near park areas. Several proposals for such reactors have been referred to NPS for review. One called for a nuclear power plant on Bodega Head near the northern tip of Point Reyes National Seashore in California.

While the Atomic Energy Commission must approve and license nuclear reactors, NPS has the responsibility of evaluating them for possible adverse effects on park visitors and resources. Much harm may result from radioactive wastes or the heating of great quantities of cool water vital to aquatic life and wildlife.

NPS recently reviewed a proposal for a dual-purpose

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National Park ranger teams like this one at Crater Lake in Oregon must be ready for rescue work at any time. At stake, often, is human life.

nuclear power and water desalting plant which could affect drastically the Lake Mead National Recreation Area in Nevada and Arizona and the Joshua Tree National Monument in California. The nuclear plant would be either on the Pacific or the Gulf of California. Under the tentative plan, 2 to 2.5 million acre-feet of desalted water a year would be piped into Lake Mead, Lake Mohave, which is also in the National Recreation Area, or Lake Havasu.

NPS is vitally concerned about the hydrological, biological, and other effects which such a vast quantity of desalted water might have on these recreation lakes. Desalted water is similar in quality to distilled water. The quality and quantity of water for farm and human use in the Lower Colorado River Basin states and Mexico would definitely improve, however.

If the nuclear and desalting plant is located in southern California, a power line and aqueduct would be constructed along the edge of Joshua Tree National Monument. NPS would oppose any encroachment on its lands regardless if feasibility studies should show cost advantages in selecting a route through the monument.

Mountain Rescue Work Soars

Grassroots cooperation is a life-and-death matter for many NPS areas. In 20 national parks and monuments, mountaineering grows increasingly popular. The life of an injured or stranded climber may hinge on outside assistance, not only in actual rescues but in the form of advance training as well.

The payoff on advance training may come months later when a climber is caught on a glacier in 150-mile-an-hour winds. Or it may occur as it did at 3:30 in the morning one day in August 1967 on the steep slopes of Disappointment Cleaver, 12,200 feet high on Mount Rainier in Mount Rainier National Park in the State of Washington.

Disappointment Cleaver is a solid rock ridge which cleaves two great glaciers and has spelled failure or injury to many a summit climber. In the pre-dawn darkness of Aug. 1, a mountaineering party was taking a brief pause on the Cleaver's towering flanks preparatory to a final assault on the 14,410-foot summit.

A large rock, probably dislodged by the adjacent Ingraham Glacier, fell on the right leg of a 41-year-old Californian. He yelled; the rock apparently had broken his thigh. Men have died of shock from fractured femurs. At that hour and place shock was a stark reality. A messenger sped down the mountain to Camp Muir at the 10,000-foot level.

By 5 a.m. the Paradise Ranger Station, at 5,400 feet, was receiving Camp Muir's emergency radio call. Paradise called for a helicopter from McChord Air Force Base some 35 miles away near Tacoma. Ordinarily McChord pilots will answer a Mount Rainier rescue call as fast as they can run to a helicopter. On Aug. 1, however, no 'copters would be available till 4 p.m.

A rescue team of four men from Camp Muir began the ascent of Disappointment Cleaver shortly after day-

light. A crew of six set out from Paradise for Camp Muir. By 9 a.m. the Ingraham Glacier was breaking up so badly under a spell of hot weather that the mountaineering group radioed that ground evacuation of the injured man would be difficult. There was some doubt whether the uninjured climbers could cross the glacier.

The climb leader had given the injured man sedatives to ease the pain of the descent. With his leg in a traction, the victim was inched down the mountain to Middle Gap on Cathedral Rocks. Meanwhile, Alpine Helicopter at Renton, 54 miles northwest, had reported it could supply a helicopter. At 1:30 p.m. the 'copter, with a park ranger guide, landed at Middle Gap, took the casualty aboard, and was off to Lakewood General Hospital in South Tacoma. The injured man recovered.

Behind this story lie months of cooperative effort by NPS, Mount Rainier Guide Service, McChord Air Force Base, the Forest Service, Lakewood General Hospital, the Weather Bureau, the State of Washington, the National Ski Patrol, and the Mountain Rescue Council, formed in Seattle in 1948.

There have been many more hazardous NPS rescues than this. The 55-hour rescue in August 1967 of Gaylord K. Campbell, 26, near the summit of 13,776-foot Grand Teton Mountain, Grand Teton National Park in Wyoming, probably never has been surpassed for sheer difficulty, skill, and courage.

There is in such rescues a form of conservation—the conservation of human resources. And the term refers to the rescuers as well as to the rescued.

Survival Seminar Held

Mountaineering is the fastest growing activity in Mount Rainier National Park. When the park held its Winter Survival and Medical Emergencies Seminar, Jan. 13-19, 1968, a major objective was closer cooperation among neighboring rescue units. Snow rangers from Snoqualmie and Gifford Pinchot National Forests, and three members of the Tacoma and Central Washington units of the Mountain Rescue Council attended. Rangers from Olympic, Lassen, and Crater Lake National Parks, and from Coulee Dam National Recreation Area were among the 25 trainees.

Three Puget Sound doctors, all accomplished mountaineers, contributed a full day's instruction on medical emergencies. A retired U.S. Army colonel of the Cold Weather Command conducted the winter survival session. His assistant was the Search and Rescue Coordinator for the State of Washington, which also provides manpower and equipment resources.

In Flathead County, Mont., the sheriff and Glacier National Park have an agreement assuring reciprocal assistance in search and rescue operations. Rocky Mountain National Park in Colorado was co-host, with the Colorado-Wyoming Regional Council, at the Mountain Rescue Association's national convention. Mount McKinley National Park in Alaska has taken part in rescue conferences with the Alaska Rescue Group, the Rescue Coordinating Center at Elmendorf Air Force Base, the Mountain Rescue Council, and the Institute of Arctic Biology.

Sequoia and Kings Canyon National Parks in California work closely with the Fresno County Sheriff's Rescue Team and members of the California Division of Forestry. Rangers from Olympic National Park in Washington assist Olympic College in its mountaineering course. When the Mountain Rescue Council holds practice rescue sessions in the park, rangers participate. Canyonlands National Park in Utah held a climbing and rescue training program for the San Juan County sheriff's office and jeep patrol. The Potomac Appalachian Trail Club Climbing Division contributed the services of a physician and a climber for a two-day NPS session on climbing at the Mather Training Center, Harpers Ferry National Historical Park in West Virginia.

20 Years of Effort for One Park

Secretary Udall cited as "a prime example of cooperation," the creation of Piscataway Park in Maryland to preserve the view from Mount Vernon across the Potomac. At the formal establishment of the park on George Washington's Birthday, 1968, he hailed "a new concept in Federal-State-Local Governmental cooperation with the help of private organizations . . ." He especially cited Rep. Frances P. Bolton of Ohio and the Accokeek Foundation of which she is president; the Alice Ferguson Foundation, and the Moyaone Association. The two foundations donated 465 of the park's 956 acres. Owners of 1,202 acres granted scenic easements provided through 168 private donors.

The park's establishment climaxed 20 years of effort by conservationists, members of Congress, and Government agencies. Congress assisted substantially in acquiring the land but, as Secretary Udall said: "The Federal Government could never have done this alone."

Piscataway Park is one of the newest of the Historical Areas which enable NPS to meet the public's surging interest in American history. For one of these 167 areas, NPS went not only to the grassroots, but to Grass Valley, Calif. The objective was a taped recording from the last surviving cavalry veteran of the Indian campaigns.

In his 101st year, ex-Cpl. Reginald A. Bradley, Troop C, 4th Cavalry, later a rancher, gave a remarkably clear account of his tour of duty at Fort Bowie, a remote Indian war outpost in the Arizona desert. The recording will be used as part of an interpretive program when Fort Bowie National Historic Site is opened to the public.

Corporal Bradley, then a 22-year-old Englishman, arrived at Fort Bowie in 1889. Site visitors will hear him describe that day. In his recorded recollections, he said:

"Fort Bowie looked like a fine set of buildings when I came here to join the Army Nov. 23, 1889. . . . Day followed day, with little to break the routine, except

once in a while a long, hard chase after Apaches running loose from their reservation. Soldiering was a hard, dry business in Arizona 78 years ago."

One of the most eloquent examples of NPS cooperative achievement is the Gateway Arch of the Jefferson National Expansion Memorial in Missouri, dedicated May 25, 1968 by Vice President Hubert Humphrey. The 630-foot Arch is, in a sense, a triumphal arch—a triumph of the people of St. Louis, of civic resolution of Federal, State and City teamwork, of engineering achievement, and of the late American architect Eero Saarinen.

It is the dominant feature of the striking Memorial which has replaced 40 blocks of the St. Louis industrial waterfront. A generation of cooperative effort raised this arc of stainless steel on the banks of the Mississippi. The many organizations sharing in the effort include such civic, business, and labor organizations as Downtown St. Louis, Inc.; the Advertising Club of St. Louis, and the International Ironworkers. Major religious faiths contributed generously. NPS entered into cooperative agreements with many organizations, including the Jefferson National Expansion Memorial Association, and the United States Territorial Expansion Memorial Commission, established by Congress.

The Memorial is one of the great urban cooperative achievements of NPS. Perhaps no finer tribute could be paid the Pioneers and the Westward Movement than this successful transformation of urban drabness into urban beauty.

Bureau of Outdoor Recreation

The number of Americans who look to the outdoors for relaxation and re-creation continues to rise. Our last remaining recreation lands and waters continue to diminish — especially under the crush of modern development in rapidly expanding urban and suburban communities.

Here is a dilemma of our times that grows more difficult to resolve with each passing year. And yet, there are hopeful signs.

Never before have so many people been so aware of the value of our natural resources. Using their voices, their votes, and their money, they are starting or supporting Federal, state, local, and private programs to save what is left—to assure outdoor recreation opportunities for this and future generations.

—A teenage club president writes ". . . We understand the Federal Government helps cities build new playgrounds. Please send us information . . ."

—A Congressman receives a letter from a constituent asking what Federal assistance is available to help a county clean up a lake for public swimming . . .

—A corporation donates land worth hundreds of thousands of dollars to help expand a state park . . .

—Conservation-minded men and women participate in public hearings on proposed public recreation areas . . .

Hundreds of instances of citizen involvement in our use of the outdoors can be cited from the files of the Bureau of Outdoor Recreation (BOR), where most of these requests for information are answered.

The Bureau of Outdoor Recreation, established in 1962, neither manages nor owns lands or waters. Its concerns cover a broad range—from preserving our natural splendors to providing playgrounds in urban America. Prime responsibilities are to coordinate Federal, state, and local public recreation programs; plan

for the future; and administer the Land and Water Conservation Fund Act, which provides money to buy Federal recreation lands and helps states buy and develop "close-to-home" outdoor recreation areas.

These programs are carried on by a force of nearly 500 people, many of them specialists in their fields, and most of them outdoor men and women by choice, in the Bureau's Washington, D.C., headquarters and in regional offices in Philadelphia, Pa.; Atlanta, Ga.; Ann Arbor, Mich.; Denver, Colo.; Seattle, Wash.; and San Francisco, Calif. Their outdoor avocations range from white water canoeing to herpetology, the study of reptiles.

In the course of the working year, the BOR staff responds to about 300,000 items of correspondence—7,000 requests for information from Congressmen, governors, mayors, and other public officials, and private citizens, all requiring special handling, and more than 290,000 general information inquiries from private citizens and organizations.

Two Acres Saved for One Lost

As 1968 began, Secretary Udall announced that more undeveloped lands (1.7 million acres) had been saved in 1967 for public use in forest, park, open space, fish and game, and multipurpose reservoir areas, than had been lost to non-conservation development (750,000 acres).

Many of these conservation acres were bought with Land and Water Conservation Fund money.

Federal Areas. The National Park Service, the Forest Service, and the Bureau of Sport Fisheries and Wildlife added more than 150,000 acres to their recreation estates in 1967, bringing the total Federal lands acquired through the Fund to more than 313,000 acres.

Among the most important purchases were those in the Delaware Water Gap (N.J.-Pa.), Whiskeytown-Shasta-Trinity (Calif.), Mt. Rogers (Va.), and Lake Mead (Ariz.-Nev.) National Recreation Areas; Fire Island (N.Y.), Cape Cod (Mass.), and Assateague Island (Md.-Va.) National Seashores; the Ozark National Scenic Riverway (Mo.); the National Key Deer Wildlife Refuge (Fla.); and the Sylvania Tract in the Ottawa National Forest (Mich.).

An outstanding example of determined citizen conservation is one that resulted in a new Federal recreation area on the Maryland shore of the Potomac River, opposite historic Mount Vernon.

Local citizens, the Mount Vernon Ladies Association, and the Accokeek Foundation joined forces to preserve the land. They offered title to some acres, and scenic easements to others, if the government would establish a park there. They supported Federal legislation to create the park. And they won. Piscataway Park, at Accokeek, now is a unit of the National Park System.

Fun is where you find it. On Lower East Side New York youngsters go for vest pocket parks. Maryland anglers prefer fishing in the Potomac rapids.

State Areas. Under the Land and Water Conservation Fund Act of 1965, which will continue through 1989, states must raise half the cost of approved outdoor recreation projects in order to receive matching amounts of Federal assistance funds.

In the states, citizens show their enthusiasm for outdoor recreation projects by voting for bond issues that will cost them money, and by making out-and-out dona-

tions of land or cash to help the states meet their obligations.

Bond issues made possible the development of 750 tent and trailer sites and supporting facilities at Prince Gallitzin State Park in Pennsylvania—by providing more than $836,000 for the state. Some $50,000 was raised through a Board of Education bond issue for park development in the town of Nutley, N.J.

In California, the "Save the Redwoods" League, which has made many contributions for the preservation of redwoods, donated $1,075,000 toward acquisition of the 1,600 acre "Avenue of the Giants" for California's Humboldt State Park. Total cost of this project will be $7 million in state and Federal funds.

A 10-acre park in Calcasieu Parish, La., and a 19-acre recreation area in Granite Falls, N.D., among others, are being bought and developed with Federal help because private citizens cared enough to contribute cash and land.

Throughout the Nation, about 1,500 projects were approved in 1968 for assistance, bringing the total of federally assisted outdoor recreation projects by states and their political subdivisions to well over 3,000, a substantial number of them located close to where large numbers of people live.

Among outstanding projects was the designation of the 208-mile Willamette River Greenway in Oregon, which eventually will provide a system of recreation camps, trails, scenic roads, and regional parks in eight counties.

New spray pools in Chicago and swimming pools in New York's Harlem and Bedford Stuyvesant sections will bring healthful recreation facilities to these heavily populated and economically pressed areas. A Rhode Island project will preserve some of the state's South Shore barrier beaches, and the tip of Key Biscayne in Florida is being developed into a state recreation area. A marina, ski slope, and sportsmen's area at Dillon Reservoir State Park are being added to Ohio's outdoor recreation resources. Swimming facilities, playgrounds, a bridge, a trail, and landscaping will be added to a public park in Manhattan, Kans.

The new recreation areas and facilities approved in 1968 will bring pleasure to tens of millions of people, young and old, rich and poor.

The Land and Water Conservation Fund. This year, in amendments to the Land and Water Conservation Fund Act of 1965, Congress strengthened the Fund and its programs in a number of ways.

The Fund's income, which had been averaging about $100 million a year, was increased to $200 million for the five fiscal years beginning July 1, 1968, and ending June 30, 1973.

This legislation will help the Fund meet increasing demands being made upon it by the State grant program, and at the same time enable more immediate acquisition of authorized Federal areas — those already authorized by Congress but not yet funded, and those now being considered for acquisition which are expected to be authorized in the near future. Among the latter are the proposed and long-sought Redwood and North Cascades national parks, new national lakeshores on the Apostle Islands and Sleeping Bear Dunes, and areas for a nationwide system of trails and a nationwide system of scenic rivers.

Appropriations from the General Fund and, if necessary, revenues from the Outer Continental Shelf leasing programs, were authorized to make up the difference between the $200-million figure and the Fund's income from Federal recreation area fees, the sale of U.S. surplus real property, and the motorboat fuels tax.

The legislation continues through March 31, 1970, the Federal recreation area fee system, including the $7 annual Golden Eagle Passport which will be issued for the year beginning April 1, 1969.

To counteract the land price escalation that increases costs of new Federal areas when there is a time lag between Congressional authorization and appropriation of funds, the National Park Service, the Forest Service and the Bureau of Sport Fisheries and Wildlife were authorized, during the next two fiscal years, to contract for authorized park and recreation areas in advance of appropriations. With this advance authority to spend a total of up to $30 million a year on contracts in fiscal years 1969 and 1970, the Federal agencies will be able, in many instances, to eliminate land price escalation costs which in the past have added more than 10 percent a year to the original estimated cost of new areas.

Immediate and long-range planning is a major responsibility of the Bureau of Outdoor Recreation.

At the Federal level, the Bureau helps land-managing agencies maintain and coordinate acquisition programs in keeping with Congressional directives, national needs, and the budget.

Revised Statewide Plans Submitted

On the state level, Bureau planners work with state liaison officers on comprehensive outdoor recreation plans which must be updated regularly for state participation in the Land and Water Conservation Fund program. By the end of fiscal 1968, all the states, the Commonwealth of Puerto Rico, and the Territories of American Samoa and Guam had submitted revised statewide plans. Compared with the first plans, these later efforts show the states are working much more closely with other levels of government in analyzing and carrying out their outdoor recreation programs.

This recurring state revision of plans has a far-reaching effect on the overall recreation prospects for the Nation, since the collective state plans contribute significant information toward analysis of America's outdoor recreation needs.

On the national level, the Bureau of Outdoor Recreation has been developing a Nationwide Plan for Outdoor Recreation as specified in the Bureau's Organic Act. It will be submitted to the President and Congress. Designed as a basis for action by public policy officials, legislators, and private recreation interests, the Nation-

wide Plan will be a summation and a measurement of the status of the Nation's outdoor recreation resources and needs.

In 1968 the Bureau also began work on the second nationwide outdoor recreation plan, due in 1973.

As our recreation lands and waters become more difficult to acquire, it becomes ever more important to identify possible new areas.

The Bureau of Outdoor Recreation is authorized to make studies toward this end, in cooperation with other Federal agencies and state and interstate resource groups. These studies, made at the request of the President, the Secretary of the Interior, and members of Congress, among others, are used as the basis for reports and recommendations that later may be implemented by legislative action.

Island Inventory Completed

In the past six years, recommendations for recreation areas on Fire Island, Assateague Island, and in the Whiskeytown-Shasta-Trinity areas have been incorporated in administration-sponsored legislation that resulted in the designation of national recreation areas in those regions. Other studies on the Redwoods (Calif.), the North Cascades (Wash.), several nationally important scenic and historic trails, and wild and scenic rivers have been important factors leading to the introduction of enabling legislation in Congress.

America's Islands. A major accomplishment of the year was completion by BOR of a study of American islands off the Atlantic, Pacific, and Gulf Coasts and in our inland waters. This island inventory is the first of its kind. A report on the study will contain recommendations for the islands' recreation and conservation use.

Rivers and Other Recreation Areas. Major river studies under way during 1968 included the Missouri River from Yankton, S.D., to Fort Benton, Mont., and the Connecticut River from its source in northern New Hampshire near the Canadian border to its mouth.

The Bureau also has certain responsibilities regarding the Potomac and the Hudson Rivers.

As a member of the Recreation and Landscape Sub-Task Force for preserving the Potomac River, the Bureau, with the National Park Service and the Forest Service, surveyed the recreation potential of the river between the District of Columbia and Cumberland, Md. President Johnson and Secretary Udall proposed that the Potomac be designated a National River and, in the President's words, serve as a "model of scenic and recreation values for the entire country."

The Bureau has had continuing responsibilities in the Hudson River area since it completed a survey and published a report concerning that river in 1966. The Hudson River Basin Compact Act of 1966 directs the Secretary of the Interior to negotiate with the States of New York and New Jersey to preserve the scenic, recreation, and historic resources of this river which is being considered for designation as a National Scenic River. In 1968, as in previous years, the Bureau reviewed, evaluated, and made recommendations on numerous proposed projects along the river basin.

Water Resource Studies. Under its Organic Act and the Federal Water Project Recreation Act of 1965, BOR evaluates selected river basin projects of the U.S. Army Corps of Engineers, the Bureau of Reclamation, other government agencies, and private interests requiring a Federal license or permit. In all, the recreation potential of some 400 of these projects was reviewed by the Bureau in the past year.

Wilderness Areas. The Bureau reviewed some 30 wilderness areas proposed for designation by the National Park Service, the Forest Service, and the Bureau of Sport Fisheries and Wildlife.

Other surveys were made of the Meramec Basin, of Missouri, Raystown Reservoir, in Pennsylvania, and the states of Ohio and Illinois.

Grassroots conservationists often participate in the Bureau's resource area studies, particularly as facts are gathered in the field and when legislation is being considered.

Sometimes, as in the case of the Connecticut River National Recreation Area Feasibility Study, they are invited to make their contributions at public hearings. At these hearings, citizens express themselves freely on many subjects—from the kinds of recreation facilities they consider advisable to their thoughts on zoning, land trusts, tax incentives, scenic easements, and acquisition costs. Their opinions are put in the record and given serious consideration.

Historic Waterfront Preserved

The Department of Transportation Act of 1966 requires the Department of Transportation to consult with the Departments of Housing and Urban Development, Agriculture, and Interior to protect, when possible, public parks, recreation areas and wildlife and waterfowl refuges from encroachment of highways and airports. Public opinion and action often support these conservation efforts.

A stretch of the Delaware Expressway along Philadelphia's historic waterfront is an example of what can be accomplished when the people and public agencies act together.

A 10-lane highway through the area was planned by the state highway department. An interdepartmental task force from the Departments of the Interior, Housing and Urban Development, and Transportation, supported by two Senators, the Governor, the Mayor, the City Council, and 100 civic organizations effected an important change. The highway now will be built below ground and concealed with a landscaped cover that will enhance the scenic vista of the historic area.

Similar cooperative efforts seek to save park and recreation lands in San Mateo County, Calif., the Gore Range-Eagle's Nest Primitive Area in the Rocky Mountains of Colorado, the Nestucca Sandspit near Pacific City, Ore., and many other locations.

The Colorado Open Space Coordinating Council, Inc., a non-profit conservation organization, and many private citizens brought a controversy concerning the Gore Range-Eagle's Nest Primitive Area in the White River and Arapaho National Forests to the attention of the Department of the Interior. The state highway department wanted to build a tunnel route (Interstate 70) which would have separated 7,000 acres of the area from the rest. Many conservation organizations, including the Wilderness Society, also objected to the tunnel route. A task force from BOR studied the wilderness and environmental values of the area for the Forest Service. Following its report, the Secretary of Agriculture, on May 17, 1968, issued his decision not to modify the boundary of the Primitive Area to accommodate the tunnel route. Alternative routes now are being considered.

In San Mateo County, Calif., the Departments of the Interior and Housing and Urban Development objected to construction of a section of the Junipero Serra Freeway (Interstate 280) because it would run through a public recreation area and a wildlife preserve in the City of San Francisco's watershed. The state highway department now is exploring alternative routes.

Citizen Action Stressed

BOR provides staff services to the President's Council and the Citizens' Advisory Committee on Recreation and Natural Beauty. Citizen action is stressed in these programs to improve the quality of the Nation's environment.

During the year, the Council prepared to release its report, *From Sea to Shining Sea*, which assesses efforts to improve the quality of our environment and recommends future action.

The Council, at the President's direction, prepared to cooperate with the Secretary of the Interior, governors, mayors, and private organizations in sponsoring a series of regional workshops to focus attention on areas where greater private conservation efforts would be particularly productive.

Border Beautification Continues

At the request of the Chairman of the United States Section of the United States-Mexico Commission for Border Development and Friendship, the Council headed a program to beautify the 2,000-mile border with the designation of May 18, 1968, as Border Beauty and Friendship Day. The efforts of a BOR staff member, among other representatives of cooperating agencies, resulted in the dedication of a Friendship Park in Brownsville, Tex., construction of a vest pocket park in El Paso, Tex., numerous tree and flower plantings and anti-litter campaigns, and a cash donation by a foundation to open a swimming pool for Mexican and American children in Columbus, N.M. Efforts to improve the border environment are continuing.

The Council also studied, for future reports, the utilization and disposition of Federal surplus property, the role and potential of concessions on Federal lands, and prepared a circular setting forth guidelines for regional recreation planning to reduce the adverse impact of increasing visitor use on high-quality recreation areas.

Natural Beauty Guidelines

The Citizens' Advisory Committee published a guide to stimulate Community Action for Natural Beauty.

In the Cities: A detailed study of recreation needs in the cities is being undertaken by the Bureau in cooperation with the National League of Cities. A contract has been signed with the League to study the needs and problems of 15 selected cities.

For the Aging: A technical assistance bulletin on outdoor recreation for the elderly is being compiled by BOR and the National Park Service.

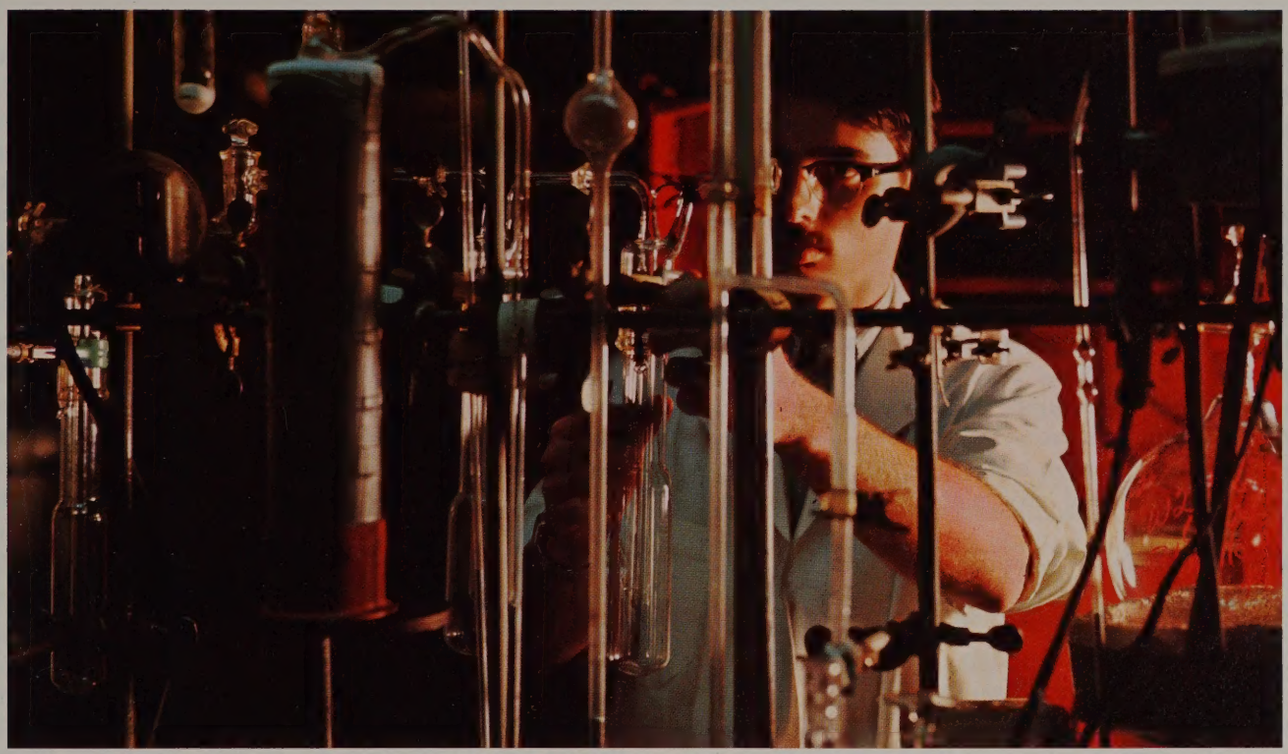
For Youth: The Bureau is participating with the President's Council on Youth Opportunity in producing a pamphlet identifying various Federal facilities available to youth groups for summer programs. The pamphlet will be distributed through Mayors' Councils on Youth Opportunity which have been organized in most cities.

For Research: In cooperation with the National Academy of Sciences, the Bureau is conducting a special Study Conference on Outdoor Recreation Research. The conference of leading scholars from the fields of natural resources, economics, sociology, political science, and related disciplines will suggest programs designed to develop long-range research needs.

For Community Action: Under a cooperative contract with the National Association of Counties, a series of 10 community action guides for public officials was published. NACO and the Bureau also are conducting outdoor recreation institutes for state and local public officials and community leaders in 30 States to familiarize them with the guides and the best techniques for their use in stimulating community action in outdoor recreation. Fifteen institutes were held in 1968, the balance will be held in the coming year.

BOR Publications

Publications for private as well as public conservationists produced by the Bureau of Outdoor Recreation included *Federal Outdoor Recreation Programs*, a compendium of over 260 Federal programs that relate either directly or indirectly to the Nation's outdoor recreation effort, and the quarterly, *Outdoor Recreation Action*, which describes Federal, state, local and private conservation efforts. *Federal Assistance in Outdoor Recreation* reached approximately 6,000 people in 1968. Second editions of *Index to Selected Outdoor Recreation Literature* and *Outdoor Recreation Research* were published.



Research helps Interior scientists unlock nature's secrets and widen man's horizons.

Geological Survey

Conservation of our Nation's natural resources has been a vital concern of the Geological Survey since the agency's establishment in 1879. Maj. John Wesley Powell, the Survey's second director, was one of the country's pioneer grassroots conservationists. His exploration of the barely known Colorado River and his *Report on the Lands of the Arid Regions* opened a new era in national thinking about the West.

Advocating the environmental approach to conservation problems, he was one of the first to realize that the individual must work hand-in-hand with nature if the land, the water, and the minerals were to serve adequately his generation and generations to come.

The Survey, largest of the Nation's earth science research agencies, has retained this spirit of dynamic conservation as an integral part of its philosophy. It solves basic problems in geology, geochemistry, geophysics, and hydrology. In 1968 the Survey accelerated its water and minerals resource studies and surveys, and stepped up its geologic and topographic activities.

Topographic maps are essential for maintaining an inventory of man's physical environment; they show all kinds of environmental features and provide clues on size, location, and how these features can be used to best advantage.

In developing a water-management program for a large drainage basin, for example, the planner must know the slope of the land, the amount of woodland cover, potential dam sites, flood hazard areas, places of pollution influx, and routes that can be used to transport water for irrigation and municipal use. Without topographic maps, the planning and execution of many types of conservation projects—soil conservation, forest inventories, biologic investigations, development of recreation areas, location of transportation and communication routes, and urban renewal projects—could not be carried out.

Under the National Topographic Program for which the Geological Survey is responsible, basic topographic maps covering the United States and its outlying areas, including the cooperative mapping programs now underway in 36 States and Puerto Rico, have been taking shape. Maps covering 2.5 million square miles, or 76 percent of the country, have been published. Mapping of the entire United States is scheduled for completion in 1976.

Increased production is largely the result of improved efficiency in mapping operations through the use of the helicopter, electronic distance-measuring instruments, portable towers, two-way radios, self-indexing balance levels, and modern angle-measuring instruments. These new instruments have increased the accuracy and efficiency of field survey operations while improved aerial cameras, more efficient stereoplotting equipment, and automation have played an important part.

These advanced techniques enable Survey mapmakers to update obsolete or substandard maps quickly and economically. For example, many of the 473 maps of the 1:250,000 scale series (1 inch equals about 4 miles)

are being revised. This series is used for military operations, geologic investigations, water resources development, highway building, and recreation programs.

In updating these versatile maps, such features as highways, industrial centers, suburban housing, dams, and shopping centers are being added in a distinctive magenta color for easy identification.

The Survey distributes more than 7.5 million topographic maps each year and the demand from urban planners, engineers, and others engaged in critical urban problems is increasing.

Planned are new mapping of 34 metropolitan areas of over 250,000 population where the need is most urgent, and revision of an additional 200 maps in major cities where the entire city map coverage is over 10 years old.

Aerial photographs, essential in producing modern maps, play a vital role in the effective planning and implementation of water, soil, forest, and mineral conservation programs. The Map Information Office of the Geological Survey in Washington keeps a detailed record of aerial photographs. Much time thus is saved in locating the best photographs for a specific need.

Official U. S. Atlas Readied

Another source of information being prepared by the Survey is a *National Atlas of the United States*. The Atlas will contain full-color maps depicting physical, historical, agricultural, economic, social, and cultural aspects of the Nation. By late 1968, it will be completed in separate sheets and in 1969 it will be collected in a bound volume.

More than a dozen maps at the back of the Atlas show the place of the United States in world affairs, such as foreign trade, investments, AID programs, Peace Corps activities, Foreign Service posts, and defense organizations. Legends for all maps will be in English, French, German, Russian, Spanish, and possibly Japanese.

The World from Space

Recently, the Survey has added photographing the earth from space to its bag of technology for solving the Nation's conservation problem.

Early in 1967, the Geological Survey reported:

"The time is near when it will be possible and feasible to accelerate our search for various resources through the use of remote-sensing devices, such as aerial cameras, radar, infrared and other instruments, mounted in high-flying aircraft and earth-orbiting satellites."

That time has arrived and the Survey, responsible for coordinating both the scientific and financial arrangements for the EROS (Earth Resources Observation Satellite) program for the Interior Department, is now involved in this exciting new way of studying our Nation from space. The object of the program is to determine and define applications of remote sensor technology to study geographic, geologic, hydrologic, marine and inland fishing and wildlife phenomena, to protect public lands and waters and to enhance national recreation areas.

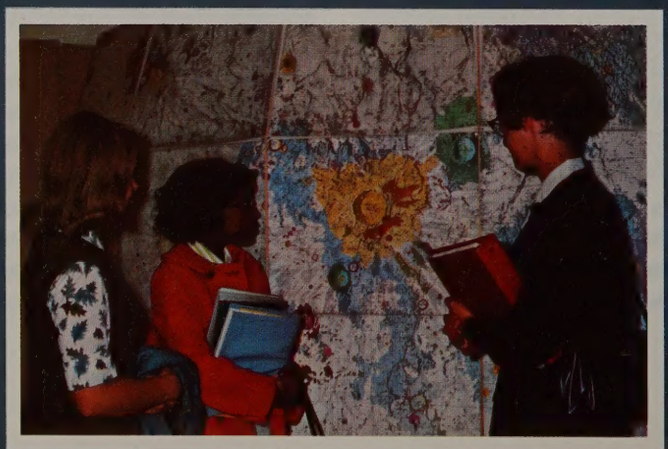
The special photographs taken by remote-sensing devices are relayed back to earth where scientists interpret what they see. The many other uses of these photographs include helping scientists to detect pollution, to predict volcanic eruptions, and to spot plant diseases.

Some significant, and not always expected, results have come from this program. Logically, scientists looked for information on natural resources from the complex instruments and cameras carried by these space vehicles. But in studying pictures taken from high-flying aircraft, they have found that infrared photography also provides important clues to urban development.

Since grass and other chlorophyllic plants are represented by a distinctive red color in infrared photography, it is possible to identify high-, middle-, and low-income residential areas from these photos. The amount of care given to personal properties also can be determined, since both the amount and the vigor of the plants are apparent from the pictures.

With these techniques, scientists may be able to identify early changes leading to degradation of population centers over wide areas. When this knowledge is available, corrective measures may be started early enough to avoid economic and social decay.

The unusual capabilities of the EROS program have also been illustrated in several other instances. Photos taken over a three-year period from Gemini and Apollo-Saturn vehicles have been instrumental in the preparation of base maps for large areas at uniform scale and under uniform lighting and viewing conditions. These maps serve as foundation plans for programs of explora-



Survey's lunar maps will cover 7 million square miles of moon. Future tourists find material for dreaming.

tion, conservation, irrigation, and communication planning, agricultural and urban development, and all related works affecting the life of man.

Among the many other Survey remote-sensing projects are a thermal pollution study of the Missouri River in North Dakota as an aid to the location and operation of industrial plants, and a project in Long Island, N.Y. The Long Island study seeks to determine the effects of urbanization upon hydrology, to aid in defining the effect of man's activities on temperature patterns of streams, and to find areas of ground-water outflow into the large bodies of salt water surrounding Long Island.

The Florida Everglades, too, is under photographic observation, to determine changes in ecology due to variations in water quantity and quality.

Glacier Photos Studied

Space photography also is being used to study South Cascade Glacier in Washington State. One photograph of the glacier taken from space gives complete coverage such as never before has been possible. From such photographs, scientists can learn more about glaciers, they can find out how much water a glacier contains, and can determine runoff patterns. Glaciers hold an estimated 2 percent of the world's water and they may someday become an important additional source of water for the world.

How Do Cities Affect Water?

As people learn how urban development affects the hydrology of their own areas, and as water problems become more evident, the need for basic water information becomes more acute. The Survey meets this need with its studies and reports on flow and variations of rivers and streams, the availability of ground water, and how the hydrology is affected. This information equips planners and water users with facts for orderly development and maximum use of available water resources, and assists pollution-control agencies in their work. Results will be projected so urban planners will be able to appraise future water problems or take steps to see that problems do not develop.

The investigation will provide information on changes and characteristics of runoff, on changes in the artesian and shallow aquifer (water bearing rocks) systems, and on the ecology of the area. Studies of the change in land character, the large use of water, and the disposal of wastes resulting from a major urban complex are expected to telescope in time the hydrologic aspects of city development.

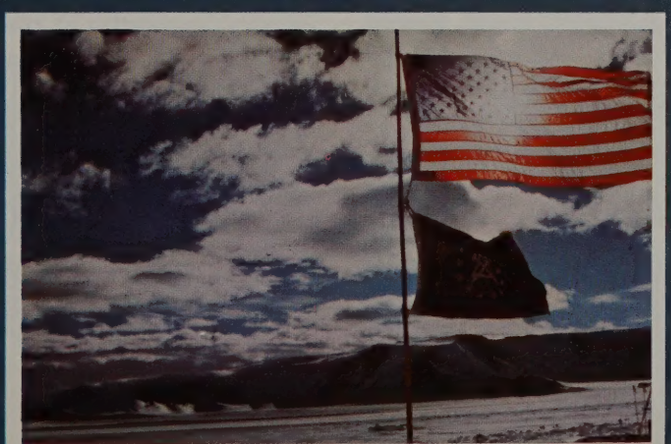
Also in process are investigations of the hydrologic aspects of recreation uses of rivers in designated wild river areas and evaluation of the mineral potential of wilderness areas. The qualities that make a stream valuable for recreation will be rated and standards will be set up for water quality, velocity, and rate of flow in summer. The objective is to identify and conserve those river features that make them attractive for recreation.

The interrelationships of water with wildlife, fish, forests, plant life, and recreational and incidental uses of a basin likewise will be studied and evaluated.

The historic Wilderness Act of 1964 and the accompanying *Conference Report* recognize that the recreational and aesthetic values of wilderness lands are exhaustible natural resources that must be preserved for future generations. The Survey, in cooperation with the Bureau of Mines, is evaluating the mineral potential of lands within or considered for inclusion in the Wilderness Lands System. Congress has recognized that mineral resource data must be obtained on these little-known areas before final decisions are made regarding them.

Few of the Survey's water projects have such immediate and dramatic results as the time-of-travel study made on the Blue River in Indiana on Jan. 1, 1968. Hydrologists were injecting a harmless dye into the river to obtain information on the behavior of waterborne contaminants when a train wreck in Dunreith, Ind., dumped a large volume of cyanide into the river. The poison killed cattle along the river, and almost all the fish and other aquatic life for 60 miles downstream. Fortunately for the downstream towns that draw water from the river, the Survey hydrologists were able to predict the cyanide's travel time over a ten-day period. This allowed state agencies to select the times and places to introduce chemicals that neutralized the toxic cyanide.

More often the effects of man on water life are less noticeable than the fish and cattle kills caused by the Blue River disaster. For example, to supply his needs, man has been diverting water that once flowed through



Survey mapping experts are exploring vast new areas of Antarctica as part of producing the first topographic maps.

the Florida Everglades. As the fresh water flow decreased, the salt water flow increased, and the plant and animal life in the Everglades was forced to adapt to the new conditions. Since 1964, the Survey has been working with the National Park Service to furnish additional facts on the water needs of the Park and to assess the impact of water changes on plant and animal life.

The disaster on the Blue River also emphasizes the need for rapid indexing and dissemination of water information. To be most useful water data must be readily available, timely, and classifiable for applied and research needs. The Survey's Office of Water Data Coordination catalogs and correlates such data for all water-related agencies of the Federal Government. During the past year the office published an index listing the location, type of data, and source of data for more than 20,000 stream-gaging stations where surface-water facts are being collected at regular intervals.

New Method Reduces Evaporation

Efforts to conserve water dissipated by evaporation have led Survey hydrologists to the discovery of a new method to reduce evaporation. They found that evaporation was reduced in a private company's large open reservoir by at least 6 percent just by bubbling air through the water. This new method not only decreased evaporation, but improved the taste of the water and increased the ability of the reservoir to support fish and other aquatic life. This first test proved so successful that the Survey is now participating in like projects at five other reservoirs in California alone.

Another method of reducing evaporation is to store water underground instead of in surface reservoirs. This method, called "artificial recharge," has been undertaken in many areas of the Nation with varying degrees of success. Right now, the feasibility of recharging declining ground-water supplies of the Southern High Plains of Texas and New Mexico is being investigated. In this area, ground-water levels have been dropping for many years, as water has been pumped out of the ground for irrigation faster than it has been replaced naturally by rain, sleet, and snow. To support the economy of the 35,000-square-mile area, about 2.5 trillion gallons of water must be imported every year. Because surface reservoir sites are inadequate to store so much water between growing seasons, and because evaporation losses from surface reservoirs are so high, it is desirable to store as much as one-half of this imported water underground. If successful and economical methods can be found to inject this amount of water in the ground, it will mean that management of water through the use of underground storage can be one of the most important techniques for water development and management to emerge in many years.

Phreatophyte Fight Goes On

Last year the Survey increased its investigations of water-using plants in the arid southwest where water is reaching capacity. These deep-rooted water-loving plants called "phreatophytes" are pests that waste enormous quantities of valuable ground water yearly, choke river channels, and cause damaging floods and deposition of sediment. Survey hydrologists have estimated that these largely useless plants cover about 15 million acres of land in 17 western states and use about 22 billion gallons of water every day—half of which is ground water. Working with state and other Federal agencies, Survey scientists are finding out how much water can be salvaged economically and are studying various salvage methods.

The Survey not only works to save water for man, but also to save man from water. Floods have plagued mankind for untold centuries, but man finally is learning to adapt to the realities of this natural phenomenon. He can't prevent all floods, but he can reduce flood damage with better planning and building. To help state highway departments plan and build better bridges, the Survey supplies reports that describe the frequency and height of floods at proposed bridge sites. A similar cooperative program with many communities produces the flood-plain maps. These show the areas inundated by major floods of the past and the probable frequency and magnitude of future floods. Such information helps city planning agencies to determine where and what kinds of buildings should be built to reduce the cost of future floods. Many areas in the United States are adopting flood-plain zoning ordinances based on the Survey's maps.

Earth's Crust Appraised

Man has used more of his basic natural resources over the past 30 years than in all the previous history of this world. Needed is fresh and useful information on new sources of supply for the metals and minerals that underpin this Nation's growth and on the characteristics and behavior of geologic materials to guide the use of our most important resource—the land itself.

In the search for new basic resources, Geological Survey scientists are appraising the physical characteristics of the earth's crust—both on the continents and beneath the sea. In pursuit of knowledge of the earth, Survey scientists are cooperating with other Federal agencies and public institutions in studying the physical nature of the solar system—beginning with the moon; for what is learned of the planets will add to the fund of knowledge concerning the planet Earth.

The Survey is conducting a wide variety of field research on the distribution, structure, chemical, and physical properties of the rocks of the earth, supported by laboratory research and development of new tools and techniques to aid in discovery of the needed mineral raw materials. Traditional analytical techniques have been extended and new techniques have been developed for determining very low concentration ("background levels") of certain elements in rocks and minerals.

The field technique of neutron activation and instrumentation, developed previously for detection of

silver ("silver snooper"), was modified to reveal the presence of gold. Indications are that concentrations of 0.3 of an ounce of gold per ton can be detected. Four different chemical methods also were developed for laboratory measurement of very low concentrations of gold in rocks.

Using newly developed prospecting and analytical tools, Survey scientists are identifying favorable target areas considered worthy of more detailed exploration and appraisal. Several discoveries of hitherto unsuspected deposits of potentially useful minerals have been made recently. A large deposit of barite, discovered in central Nevada, may become a domestic source for an industrial mineral which the United States consumes at a rate of 1.5 million tons a year. Near Denver, Colo., a large mass of rock containing rutile, an ore of titanium metal, was discovered. Though low in grade, the deposit appears to be large in size and may become a future source of titanium.

In other areas of the United States, but principally in Nevada, Alaska, and Wyoming, geologic studies have outlined target areas favorable for the occurrence of gold and silver—two metals that are in particularly short domestic supply.

To insure that adequate domestic supplies of needed minerals and metals are available for future use, the Geological Survey's Office of Minerals Exploration provides financial assistance to private industry on a participating basis. Support is offered for seeking certain scarce heavy metals. Gold and silver are only two of 36 eligible metals and minerals. For approved exploration ventures, the Federal Government provides up to 75 percent of the costs which is repaid by a royalty on production.

Resources on Sea Floor Charted

The sea floor is another target for mineral exploration. The Geological Survey is conducting a broad program of research, in cooperation with numerous universities and other Federal agencies, to decipher the geologic environment of the Continental Shelf areas and to identify places that may become sources of metals, minerals, and oil and gas. Shelf areas now under study include the Carolina coastal margin, the Gulf of Mexico, the northern California and Oregon coastal margins, and the sea floors off Washington, Alaska, and Puerto Rico.

How to Live with Earthquakes

With population pressures increasing, man is expanding his cities and towns into areas subject to natural hazards. Chief among these are earthquakes. Ways to live safely in earthquake-prone areas are being sought by the Survey through studies of active fault zones of the western United States. Scientists from the National Center for Earthquake Research in Menlo Park, Calif., are using seismographs, tiltmeters, strainmeters, magnetometers, and gravity meters to "take the pulse" of the earth along known zones of crustal weakness. By studying the responses of geologic materials to internal

Survey astrogeologists (above) help NASA astronauts learn field geology on locations where surface features are similar to moon's.

Survey volcanologists began monitoring the 1967 eruption of Kilauea in Hawaii (below) from their observatory on the crater's rim.

stresses, man is better able to construct his works on the land.

Continued Survey research on the causes and nature of volcanic activity and its danger to man and his works is concentrated at the Survey's Hawaiian Volcano Observatory, on the rim of Kilauea Volcano on the Island of Hawaii. Continuous recordings of earthquakes and earth shifts at this "model" active volcano, plus studies of the molten and crystallized lava, are providing new insights into the nature of the earth's crust and mantle and into the mechanics of volcanic action. They may also provide the means to predict an incipient volcano.

In line with its interest in the origin and evolution of the solar system, the Geological Survey is carrying out a program of space research in support of the goals of the National Aeronautic and Space Administration. The Survey's work consists of lunar geologic mapping, studies in cosmic chemistry and petrography (meteorites, tektites, and cosmic dust), geologic study of terrestrial analogs of lunar features, and development of research instruments and techniques needed to support both manned and unmanned geologic exploration of the lunar surface.

To date, a continuing program of mapping the features of the visible moon's surface has produced 13 in a series of 44 geologic maps which cover an area of about 1.5 million square miles.

Based on interpretations of lunar geology, the Survey has recommended prime sites for the first Apollo moon landing.

The Survey insures that sound conservation practices are followed in the development and production of oil, gas, and minerals on public lands and Indian lands under leasing laws and regulations. It also determines and maintains an accurate accounting of royalties due the Federal Government from these operations.

At the end of the year there were 108,397 oil and gas lease operations, covering 65,128,029 acres of land, under the Survey's supervision. Production was 478 million barrels of crude oil and gas liquids and 2.2 trillion cubic feet of gas, valued at more than $1.8 billion.

Mining leases under the Survey's supervision reached 3,332 and covered 7,280,500 acres of land. Production included 44 million tons of coal, potash, and other solid minerals.

Royalties for Fiscal 1968, ultimately credited to the States, Indians, the Reclamation Fund, and the U.S. Treasury, from all mineral leases supervised by the Survey are part of the "income" in the *Report to Our Stockholders* shown elsewhere in this yearbook.

Land conservation practices are carried out, not only in the planning stage of mining operations but also after an area is no longer productive. For example, in the recent construction of a lead mine in the National Forest land of Missouri, land conservation was a foremost consideration in planning the mining area, as well as the residential and business areas.

In strip mining, devastation of the land is unavoidable. When a coal supply has been exhausted on lands under the Survey's supervision, the surface is leveled and grass and trees are planted.

Water Resources

"Grassroots philosophy in water resource development has become increasingly important. Through a myriad of demands, proper results can be achieved only after the people have participated fully to create a united local directive."

Congressman Ben Reifel
South Dakota

Water Resources

New kinds of pollution like the 1968 breakup of the oil tanker Ocean Eagle in San Juan Harbor, pose massive new exercises in teamwork for cleanup agencies.

Federal Water Pollution Control Administration

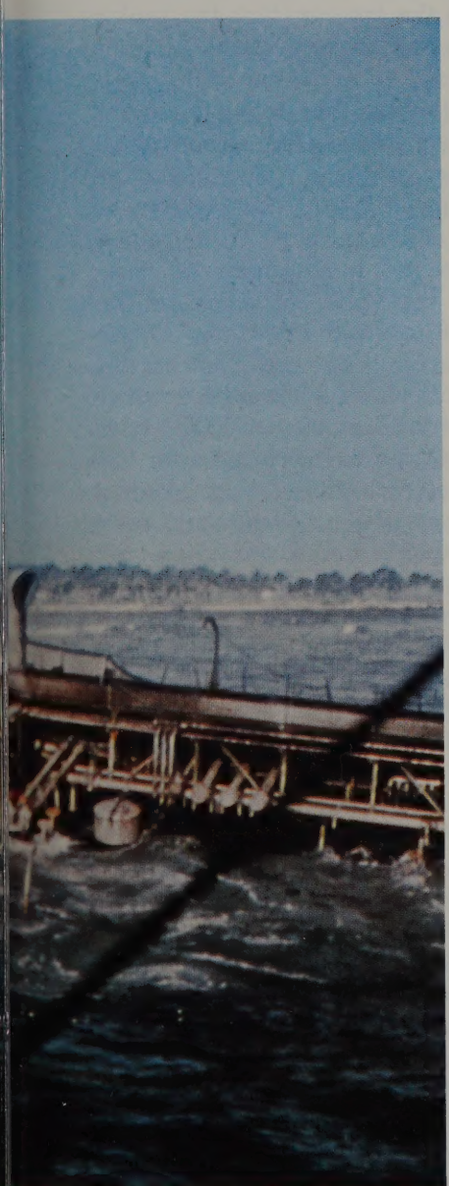
Nowhere is the need for the individual act, the individual initiative more necessary or more critical to success than in the prevention and control of water pollution . . .

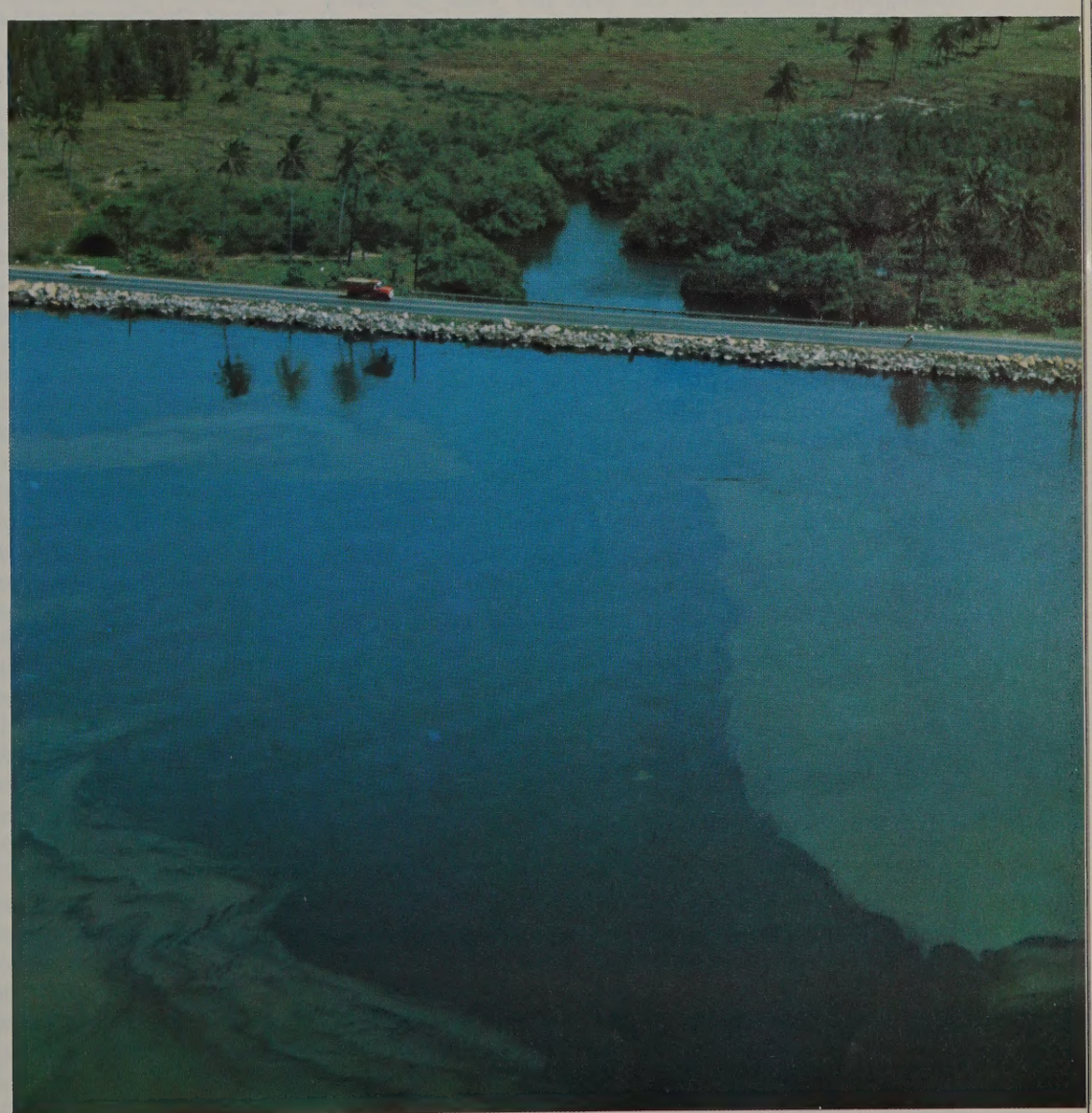
Whether it be the scientist working in laboratories for a breakthrough in treating man's growing complex wastes; or the State official battling daily to improve the ways and means of meeting the water quality standards; or the conservationist defending the Nation's resources all the way from the city hall into the halls of Congress; or the Federal expert lending his knowledge accumulated over the years to a community trying to save a dying stream.

All these people and more must exert all their energies, day-to-day, until the safety and purity of the Nation's water are ensured for all the years to come. Conserving and using our water resources must become inseparable twins—either one without the other can lead to disaster.

When the Water Quality Act became law in 1965, the grass took root and its early shoots can be seen across the Nation. The water quality standards — the new rules for clean water — started from the smallest stream and an individual who was concerned for his fishing, his swimming or simply protecting his right to have an enjoyable scenic setting.

It has grown from there to a community, county, region, state and finally to a national groundswell of anxiety and determination about water. There were confrontations and skirmishes on all levels. Many individual conservation groups and other local organizations are in large measure responsible for the water quality standards we have today. At the first public hearings they insisted on the highest possible standards. They followed through and helped the state pollution agencies resist





pressures for expediency. And they didn't let up even then. During the time the standards were under review by the Federal Government, they made their feelings known.

The individual, organized and alone, and the expert — governmental or private — have established a basically sound and forward looking set of water quality standards for the entire United States.

The Nation has cleared the second hurdle in the fast-closing race to save our water. The first was cleared when Congress enacted the basic legislation, the Federal Water Pollution Control Act. Now the last and biggest hurdle must be faced.

The Tale of 'Old Inky-Stinky'

The story of how one organization, and eventually a whole community, went to bat for their stream took place in York, Pa. It is a continuing story of teamwork and determination from the high school to Cabinet offices in Washington, and a story that will be repeated throughout the land in the next few years as water quality standards are enforced.

Codorus Creek, popularly known as "old inky-stinky," winds its way through York. At one time, it was a site of civic pride and joy. But as pollution joined the flow of water, it became a matter of disgust and challenge.

The York Chapter of the Izaak Walton League accepted the challenge — to stop the ruin of one of the city's natural attributes. At about the same time, a drought worsened the already serious situation and forced the city to import water for drinking.

To publicize the plight of the Codorus, the York chapter launched a float trip for high school students by small boat down the creek. The trip ignited student interest in pollution, especially in their hometown stream. They became willing workers with Izaak Walton League members to get the community to take action. Student enthusiasm set off a chain reaction throughout the adult population.

Naturally, political leaders became involved. Some joined the campaign wholeheartedly. Others were fearful the clean-up demands might have harmful effects on the economic life of York.

With wider backing, the Izaak Walton League petitioned the governor. The State Sanitary Water Board held public hearings to determine if the water quality criteria for the Codorus were high enough.

Up Went the Stream Standards

Further support was sought and Secretary of the Interior Udall and the Commissioner of the Federal Water Pollution Control Administration (FWPCA) paid an inspection visit to York to look at the Codorus. Perhaps sparked by this personal interest, the State board decided that higher criteria were necessary. The amount of dissolved oxygen to be maintained in the stream was raised. The amount of color to be tolerated was lowered. Fish and other aquatic life depend upon oxygen in the water for continued existence. Oxygen also plays a part in natural assimilation of wastes by the water. Color not only gives the water an unattractive appearance, but also interferes with natural life in the stream.

The community wasn't satisfied. Leaders suggested setting up a pollution patrol to police the Codorus. The state has such a plan under study.

Industry using the Codorus water has agreed to improve its treatment before returning waste water to the creek.

This story of grassroots effort to save a natural resource is being repeated across the country. But it is just a beginning. Every city, town or village must guard its water resources with the same vigilance and vigor.

The Federal Water Pollution Control Administration's achievements in 1968 were, in many cases, the results of many such incidents. The Division of Technical Services of the FWPCA reflects this day-to-day partnership among governments, industry, and individuals.

Oil pollution illustrates this working togetherness. About 9 a.m. on March 3, 1968, the Coast Guard informed the Department of the Interior that the tanker *Ocean Eagle* had broken in half at the mouth of the San Juan Harbor in Puerto Rico, and was losing oil.

It was an emergency situation that called for quick action. A team of FWPCA experts was organized and coordination began with other agencies. The regional director in Atlanta, Ga., informed FWPCA headquarters he had received confirmation of the mishap. Technical experts from the regional office flew to San Juan. An officer in the Executive Office of the President discussed authority and funds available to FWPCA to help Puerto Rico combat spreading oil pollution.

Communications, a critical factor during the developing situation, were erratic at the beginning. FWPCA tried to contact a Coast Guard station in Puerto Rico for further details, but could not reach the station. Contact was made with the 7th Coast Guard Headquarters in Miami, but it also was unable to make connection with Puerto Rico on government phones. FWPCA switched to commercial telephones to reach the island.

FWPCA headquarters officials flew to Puerto Rico. The following morning, March 4, the FWPCA team flew over oil-polluted areas and filed a status report with headquarters. The Army offered to provide military assistance if needed. To aid the cleanup, the American Petroleum Institute identified the type of oil spilled. To coordinate a plan of attack, the Coast Guard called a meeting of all Federal agencies, the Commonwealth of Puerto Rico, and the Gulf Caribbean Refining Corp., owner of the cargo. The FWPCA recommended against the use of detergents and suggested, instead, the recovery of oil from surface waters and beaches by using vacuum pumps, adsorbents, and booms for herding the oil and protecting beaches not yet contaminated.

FWPCA further recommended that the cleanup be cut into two operations. The marine operation, coordinated by the Coast Guard, would involve salvage, towing, and oil control at sea and in the harbor. The beach and near-

shore operation, to be directed by FWPCA along with the Puerto Rican government, would involve oil pickups, beach cleaning, and disposal of oil.

Teamwork was an important factor. Scientists from the FWPCA and from the Marine Institute of Puerto Rico discussed the use of detergent chemicals and their effects upon marine life. In the end, they agreed it was best not to use these chemicals as long as water pollution was a consideration.

Congress, which was considering legislation related to oil pollution at the time, was vitally interested in the *Ocean Eagle* situation and requested information.

Along with government agencies, the public became involved. People caught oil-soaked pelicans, washed and fed them. A San Juan supermarket donated frozen fish to feed the birds. Half the birds treated were saved, compared with only 5 percent at the time of the *Torrey Canyon* disaster in England.

Clean-up operations were now in full swing. The Puerto Rican Department of Public Works was cleaning the beaches while Gulf Caribbean was using a lightering barge to pump oil from the water. This procedure proved to be one of the most successful oil removal devices tried during the operation.

Other agencies and departments participating in the emergency operations were the Department of Defense, the U. S. Army Corps of Engineers, the Office of Emergency Planning, and the Bureau of Sport Fisheries and Wildlife.

Joint Study Undertaken

After the *Torrey Canyon* disaster, President Johnson directed the Department of the Interior and the Department of Transportation to prepare a comprehensive study of the problem of oil pollution. FWPCA, working with the Coast Guard, undertook the study and submitted to the President a thorough review of the situation with recommendations for improving pertinent laws and treaties.

Contingency plans have been developed by regional offices of the FWPCA to coordinate measures for handling all types and sizes of spills occurring in their sections of the United States. The *Oil Pollution Report* proved its worth in *Ocean Eagle* episode and will grow in usefulness in years ahead.

Aid Given for Special Problems

Technical assistance in 1968 was supplied by the FWPCA to several regions and states to assist in coping with spills of oil. Examples of such assistance include the James River, Va., pipeline break, the massive oil pollution of Lake Michigan, the grounding of the tanker, *R. C. Stoner* at Wake Island, and oil pollution on the New Jersey coast.

When industry, particularly electric power generating plants, discharge hot water to streams or lakes, the many beneficial uses of water may become impaired. It is predicted that thermo-electric production in the United States will reach 2,000 billion kilowatts per hour by 1980. And such production will require 200 billion gallons of water per day, of which 94 percent would be used for cooling.

Most steam plants in the United States, both fossil- and nuclear-fueled, take cooling water from its source in open-circuit cooling systems, discharging the heated coolant directly back into the water somewhere below the point of intake. This nearly 200 billion gallons of heated discharge water compares to an annual nationwide runoff totaling 1,200 billion gallons per day. In other words, a quantity of coolant equivalent to one-sixth of the total amount of available fresh water will be necessary for cooling the steam-electric power-producing plants. During the two-thirds of the year when rivers flow below flood stage, about half the total freshwater runoff will be required for power plant cooling water purposes at inland locations.

Thermal Pollution Aired at Hearings

Probably the single most important activity during the year dealing with the problem of thermal pollution was the public hearings held throughout the Nation by the Senate Subcommittee on Air and Water Pollution and participated in by the FWPCA.

At a hearing in Miami, Fla., the possible pollution dangers to be caused by the planned Turkey Point nuclear power plant were investigated. Sen. Edmund S. Muskie said the hot-water discharge from the plant will definitely produce changes — possibly harmful changes — in Biscayne Bay.

But the Florida Power & Light Company chairman said marine life in the bay would not be harmed and might even be helped by slightly warmer water. Most witnesses agreed that much research is needed regarding the introduction of artificially heated water into cooler natural environments.

The state president of the Izaak Walton League said the League wasn't against the plant itself — "Just the needless destruction of the bay without knowing what's going on."

FWPCA asked the Army Corps of Engineers to withhold permission to build the canal to carry the coolant water back to the bay.

To help in the nationwide study, FWPCA has established a Thermal Research Program at its Pacific Northwest Water Laboratory in Corvallis, Ore. Scientists working there will serve as a focal point for coordinating FWPCA research on the causes, control, and prevention of thermal pollution.

The FWPCA also has launched a two-year study on the biological effects of thermal pollution on the Columbia River. The $600,000 project is the first comprehensive probe into all aspects of thermal effects on the aquatic environment.

Estuary Crisis Action Taken

Partnership and grassroots action again becomes prominent and important in the Nation's now developing campaign to protect estuaries. Estuaries are formed

where a river meets the sea, and they are abundantly rich in fish, shellfish, birds, oil, and minerals.

But unless people — government, scientists, industrial and private — act now, these riches will be lost to present and future generations.

Fortunately, such action has begun and is constantly picking up momentum. Congress took the initial step by calling on FWPCA in the Clean Water Restoration Act to lead a comprehensive study of the estuarine crisis.

Facts for the study are being obtained from every source available. Consultations and exchanges of information between Federal, state, and national organizations are underway. Technical studies are being done within the FWPCA. A National Estuarine Register is being established as repository for basic information on estuarine uses, values, and water quality.

The FWPCA is contracting for studies of estuarines. Following are a few examples:

— Battelle Memorial Institute, Columbus, Ohio, $154,484, to review and document studies and statistical data on the overall national socio-economic values of the estuaries, and especially the Chesapeake Bay . . .

— Florida State University, Tallahassee, Fla., $27,100 to analyze the socio-economic values of Apalachicola Bay in Florida . . .

— University of Rhode Island, Kingston, R. I., $27,000, to study the socio-economic values of Narragansett Bay in Rhode Island . . .

— Office of Business Economics, U. S. Department of Commerce, Washington, D.C., $25,000 to measure and project economic activity — population, employment, and income — which is influenced by estuaries and subsequently affects them . . .

— Texas Water Quality Board, Austin, Tex., $50,000 to develop a regional socio-economic study for a water-quality management plan in Galveston Bay and its tributaries.

The Public — Pro and Con — Is Heard

Significant public hearings are being held throughout the coastal states to receive information and opinions of the people who live and prosper beside the estuaries.

At a public hearing in Jekyll Island, Ga., business executives recommended caution before any new regulations are established because of the lack of reliable data on pollution in estuaries. Other witnesses urged action now to prevent any more damage. Testimony at all the hearings underlined the importance of the FWPCA study due for Congress in November, 1969.

Other steps — Federal, state, and local — that have been taken to protect the estuaries include: Fourteen enforcement actions by the FWPCA to abate pollution in coastal areas; development of comprehensive water pollution control programs for the major river basins of the country, including coastal areas; and establishment of water quality standards for interstate and coastal waters.

The San Francisco Bay Conservation and Development Commission has undertaken a major study on the values and management of the California Bay. Several states have adopted laws to control and preserve their wetlands.

The Department of the Interior and the Army Corps of Engineers have signed an agreement that pledges "full coordination and cooperation" in considering applications for permits to alter existing estuarines and other areas by dredging, filling, and excavating.

All in all, concerted efforts are beginning to be made to protect estauries, and the future looks even brighter.

Citizens Help Decide Treatment

The Federal Government, through the FWPCA and other agencies, becomes closely involved with local governments and individuals in making sewage treatment plant construction grants. This effort starts at the local level. Private citizens at public hearings before their elected representatives help decide what type waste treatment is needed and then must give their approval for a bond issue. When the project is approved by the state pollution control agency, it is forwarded to FWPCA for a Federal grant. These grants can be as high as 55 percent of the project's cost.

Since the Federal Water Pollution Control Act became permanent law in 1956, more than 8,100 sewage plant projects have received Federal assistance totaling more than $1 billion on $4.5 billion worth of treatment plants serving about 66 million people. And the funds have helped improve the quality of water in 67,000 miles of streams.

Enforcement and the Private Person

Enforcement is another water pollution control program which depends upon the partnership of the private as well as the public person in America. Despite the coercive connotation of the word, "enforcement" actually is the joint meeting of all the parties involved in a particular pollution problem, and agreement upon unified action.

Usually the initial request for an enforcement conference comes from the governor of a state, reacting to the wishes of industry, government, and private groups within the polluted area. The Secretary of the Interior can then set the stage. FWPCA provides experts to help in the often protracted negotiations.

Two historic and far-reaching enforcement conferences were held in recent months. The four-state conference on Lake Michigan may well set patterns for years because it was the first lake-wide study of all the pollution problems affecting this body of water. City, state, and Federal conferees agreed on methods and a timetable for correcting the ills of Lake Michigan.

Secretary Udall hailed the agreements reached in Chicago as ". . . not only a tremendous victory as far as Lake Michigan is concerned. It is a tremendous victory in the campaign to rescue this and other lakes throughout the country."

The five-day conference produced more than 2,000

pages of testimony and more than 100 specific recommendations. No objections were raised to the recommendations concerning the need for a high degree of waste treatment, phosphate removal, and water quality surveillance.

The pulp and paper industry of the Northwest, and indirectly the rest of the country, were served notice at the Puget Sound Enforcement Conference that they must become better members of the environmental community. The conferees gave eight mills ringing Puget Sound until Sept. 30, 1970, to begin dredging up waste solids, and two more years after that to start lowering sulfite waste liquor they dump into the sound.

The conferees recommended unanimously the adoption of the Federal report which said pulp waste discharges "excessively damaged" marine life in parts of Puget Sound. The 450-page report said where paper mill wastes have degraded water quality, extensive and damaging effects on the diverse community of aquatic life were observed ranging from phytoplankton (minute, floating plant organisms fundamental to the marine-life food chain) to migrating fingerling salmon. Sulfite waste liquors, depending on the concentration, have a marked toxic effect on marine life, notably those forms in the developmental or immature stage of the life cycle through which each must pass, the report pointed out.

Research and development, the backbone of future victories over water pollution, reflect grassroots teamwork. The FWPCA, through the authority granted it by Congress, directs a wide-ranging program into the many unanswered pollution problems. The agency awards grants and contracts to encourage public and private firms, institutions, and individuals to participate in the efforts to create new or improved methods or techniques to combat pollution.

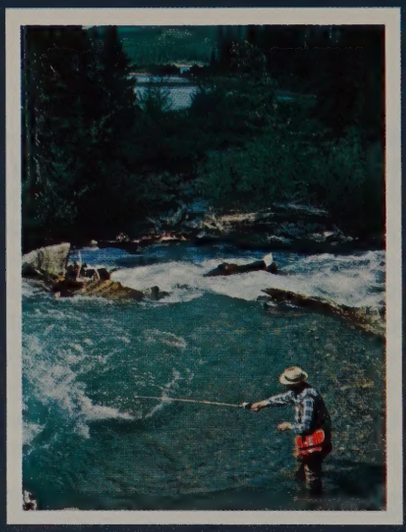
Since the Federal program of research was started in 1961, more than 2,500 grants, contracts, and fellowships have been awarded with a value of nearly $100 million.

Where man and water meet, the worst of both is likely to be found. The water's edge today as often laps a junked auto or a pile of floating debris as it does a clean beach.

Private industry, in cooperation with the Federal Government, is continually stepping up its research.

A good example of this research cooperation can be found in the campaign to halt premature aging of lakes and other surface waters by overfertilization. This aging is caused by the increasing amounts of nutrients being dumped into the waters in wastes from municipalities, industries, and by runoff from farm lands.

At Ely, Minn., on Shagawa Lake, the FWPCA operates a pilot plant to test methods of keeping nutrients from entering the lake. Through a contract with the University of Wisconsin, the effluent from this plant is being tested to determine effectiveness of various stages in the removal of phosphorous, one of the leading nutrients causing the overproduction of algae in water. Results to date have shown phosphorous removals as high as 99 percent.



Bureau of Reclamation

A teenage boy excitedly launches his first boat in a beautiful lake created by a dam on a Western river . . . a group of farmers around a table in a small prairie town discusses forming an irrigation district . . . a businessman from the East, standing in a cold, clear mountain stream, grins as he reels in a wriggling trout . . . a desert suburban resident surveys his green garden, then takes refuge from the blazing sun in his air-conditioned home . . . a farmer opens the gate on his irrigation ditch and watches the earth turn dark as water trickles between his rows of artichokes . . . an architect pores over plans that will bring scenic harmony to a dam and powerplant complex on a mighty river in the Northwest . . . a hiker walks along a mountain pathway, drinking in the fresh clean air and admiring the grandeur of the countryside.

All these people are participating in the conservation program of the Bureau of Reclamation. To paraphrase President Lincoln's famous statement, it is a program of the people, by the people, and for the people.

Individuals — singly or in groups — instigate specific Reclamation projects to conserve and develop their water supply. After authorization of the projects by Congress, the people play a leading role in developing them in cooperation with the Bureau of Reclamation. And they share in the resulting benefits of irrigation water supply, hydropower generation, municipal and industrial water supply, outdoor recreation, fish and wildlife enhancement, protection from the ravages of floods, and water quality improvement. So the people on the ground are the grassroots of the Reclamation program.

The recently authorized San Felipe Division of the Central Valley Project in California demonstrates the evolutionary process of a Reclamation development. The area lying south of San Francisco Bay was settled in the late 19th century as an agricultural community. Irrigation was essential to successful farming there, and water at first was easily obtained from the local creeks and from comparatively shallow wells which flowed at the surface under artesian pressure. But water requirements resulting from the rapid increase in acreage planted and in population of the towns which sprang up soon outstripped the water supply. As creeks ran dry in the summertime, it became necessary to pump the wells deeper and deeper.

The residents soon recognized that their water supply was strictly limited, and they organized into a water conservation district to deal with the problem. With their own funds they built reservoirs on all the nearby streams to store winter flows for use in the summer season. Facilities were constructed to transport quantities of this stored water to percolating beds where it could be absorbed into the underground aquifers and thus be available for pumping.

Still the population rose and the economy grew and strengthened. Industries moved into the towns, and more and more water was required to meet their needs. As the wells moved farther and farther into the ground, the water level sank and the earth above settled, creating serious problems in the operating of public facilities.

Their own resources were not able to stand the pace of expansion, and the people, looking for relief, found that they could purchase water from neighboring city and state agencies. But in a few years these imported supplies, too, failed to meet the ever-increasing demands for water.

Then the conservancy district, which has authority to levy taxes, asked the Bureau of Reclamation to undertake development of the area's water resources as part of the Central Valley Project. The district participated in the Bureau's feasibility studies of the proposal and in urging Congressional authorization, which came in late 1967.

As required by law, the organization contracted to repay construction costs; it also agreed to assume management when the unit goes into operation. Construction of works to carry 273,000 acre-feet of water annually from San Luis Reservoir to the thirsty farms and cities of the division will soon be underway, providing, as a

bonus, exceptional recreation opportunities and fish and wildlife enchancement. And thus another Reclamation project is born.

Operation by water users' districts is a basic factor in Reclamation irrigation water development. Of the Bureau's 118 operating projects, more than 85 percent are completely or substantially run by local organizations. The Salt River Project in Arizona, one of the first built by the Bureau, has been most successfully operated since 1917 by the Salt River Project Agricultural Improvement and Power District and Salt River Valley Water Users' Association.

Central Valley Garden Spot

The far-flung Central Valley Project, which is one of the largest water developments in the world, presents a prime example of widespread grassroots conservation. Ever since its inception in 1937, local interests have been cooperating with state and Federal government agencies not only to protect their natural resources from deterioration, but also to improve them in order to create a quality environment for their own and future generations. Coupled with a salutary climate and inherently fertile soil, the water supplied by this project is making the valley into a garden spot, where vitamin-rich fruits and vegetables are grown in abundance for America's dinner tables; water and electric supplies foster a robust economy, and outdoor playgrounds contribute to health and happiness.

The $2 billion Federal project, about half complete, now delivers more than 3.6 million acre-feet of water a year for irrigation and municipal and industrial uses. This will increase as more project works are put into operation.

On its way to perform many and varied functions, Central Valley Project water ran through 7 powerplants last year to generate nearly 6 billion kilowatt-hours of electricity, equivalent to all the power needs of the combined populations of San Francisco and Denver.

Central Valley Project water and power users and the State of California have already paid back to the Federal Treasury about $326 million of the Federal investment, and eventually they will have repaid about 90 percent of construction costs.

New wealth created by the project, of course, represents many times the amount of this cash repayment, since the project-based economy kindles prosperity which is reflected in greater tax returns and expanding business throughout the area and the Nation. To cite only one aspect of these attendant benefits, Central Valley Project water so far has helped grow crops valued at $4.7 billion, almost 4 times the total Federal CVP plant investment to date for all purposes.

One of the units of the Central Valley Project which is nearing completion, the San Luis Unit, is an unusual Federal-State cooperative effort, with some of its facilities serving both the Central Valley Project and the California State Water Plan. Its principal feature, the off-stream San Luis Dam near Los Banos, was dedicated in April of 1968 by Secretary Udall, who predicted that the obvious success of the development foretells other such joint ventures in the future.

Secretary Udall said that the unit "is good evidence of what can be done when we share an idea and put our talents and energies constructively to work to make it a reality." San Luis will store surplus winter-time runoff from northern California streams for beneficial use in the water-hungry southern two-thirds of the State.

Water users' districts in the Upper Missouri River Basin succeeded recently in obtaining Congressional authorization for two long-awaited, large-scale water-supply developments, the Garrison Diversion Unit and the Nebraska Mid-State Division of the Missouri River Basin Project. Construction has begun on the Garrison Unit, which constitutes the first major step in developing the tremendous irrigation potential of the basin. It will bring to life a dream cherished for the better part of a century by those living on the rolling prairies of the Dakotas, people who sacrificed many acres of rich bottom land when dams were built during the 30's and 40's to control destructive flooding of the river.

Water pumped from the reservoir behind Garrison Dam on the mainstem of the Missouri will be conveyed to irrigate a quarter of a million acres in central and eastern North Dakota and to supply municipal and industrial water for 14 towns and cities and four industrial areas. This Stage I of the Garrison development also will enhance fish and wildlife resources at 36 major and several smaller areas, and will provide recreational opportunities at 9 important water impoundments.

First water deliveries for Garrison Unit are scheduled for 1974. Before that date Nebraskans expect construction to start on their Mid-State Unit, which will provide a surface and ground-water supply to irrigate approximately 140,000 acres along the Platte River in central Nebraska and to stabilize the ground water which is now being depleted by more than 5,000 irrigation wells.

Water users in South Dakota have worked for years towards development of the Oahe Unit, which would divert water from the Oahe Reservoir on the Missouri to irrigate 190,000 acres in the Lake Plain area adjacent to the James River and to furnish other multiple benefits. Like the Garrison Unit, Oahe will relieve the farmers of their present dependence on restrictive one-crop agriculture and will stimulate and stabilize the overall economy.

Together, these three multiple-purpose Missouri River Basin Project additions will go far toward transforming the Upper Basin plains into an agricultural and industrial empire, as well as a vast vacationland.

Program Emphasis Shifts

As the American pattern of living has changed through the years, with a marked movement of population from rural settlement to urban concentration, so have the people's water needs altered. In the first decades of the Reclamation Bureau's existence, more than 95 percent of

the program was devoted to development of water for irrigation. Today irrigation accounts for only slightly more than half the program. One of the functions today's Westerners demand of Reclamation is municipal and industrial water supply. During the past 10 years the amount of water delivered for this purpose has increased from 63.8 billion gallons a year to more than 583 billion gallons.

Cities and Industries Benefit

Formerly a minor benefit, municipal and industrial water supply is now often one of the chief project functions. The first major development conceived primarily for this purpose went into full operation in the spring of 1968. The Canadian River Project, by means of a 322-mile long aqueduct system, delivers water from Meredith Lake behind Sanford Dam on the Canadian River in northwest Texas to 11 towns and cities in the Panhandle.

Throughout the Southwest, several municipal and industrial water-supply projects are under construction, with others being planned by city dwellers in arid areas. Water users pay project construction costs through their towns or other organizations in a manner similar to that followed by the irrigation farmers, but by law they repay these costs with interest while those allocated to agriculture are interest-free.

Also repaid by the users, with interest, are the project construction costs allocated to hydropower generation. This function of Reclamation development has, in fact, become known as the "cash register" of the program, helping repay irrigation costs where these prove beyond the ability of the irrigators to meet. By supplying low-cost power, the Bureau of Reclamation has helped bring electricity to the prairies and other sparsely settled sections of the West, as well as to the burgeoning urban areas. Grassroots electric cooperatives benefit, as do individuals, municipalities, and industries.

Electricity from the powerplant at the Grand Coulee Dam, in Washington State, has been a significant factor in the outstanding progress achieved in the Northwest the past quarter century. But its future dims what has gone before; generating capacity will be more than doubled by a third powerplant now under construction.

The new plant, which will add 3.6 million kilowatts to the present capacity of 2 million kilowatts, is scheduled to go into operation in 1973. For several years thereafter, some of the power will be used in the Southwest, where pressing energy needs are building up. This will be made possible by the Pacific Northwest-Southwest Intertie (see Bonneville Power Administration).

The revolutionary, high-voltage intertie will permit exchange of Northwest summertime surplus peaking power for Southwest wintertime surplus. In a relatively short time the entire 5.6 million kilowatts will be needed by the people and the industries of the Pacific Northwest. With a view to such rising future needs, plans call for doubling the capacity of the third power plant to bring the ultimate capacity to 9.2 million kilowatts, greater than that of any hydroplant in the world today.

No part of the Reclamation program has wider grassroots appeal and participation than outdoor recreation. On the plains of the arid West, where in years gone by some people never saw a body of water bigger than in a horse trough, the large lakes that form behind Reclamation dams are a pure joy.

Until recently an incidental byproduct of Reclamation, water-oriented recreation has become one of the chief attractions of the program. Visitors swarm to the projects to view the often spectacular scenery, to try for a "big one" in a cold lake or a sparkling stream, to camp contentedly beneath the stars with the soothing sound of lapping water in their ears, or to skim over the reservoirs in boats or on skiis. Close to 50 million visitors a year enjoy these pleasures now; and the number is sure to skyrocket as a result of a soaring population, increased leisure, mobility, and income.

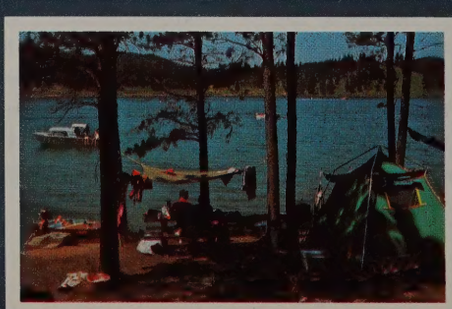
With the insidious and inevitable encroachment of urban and highway sprawl over much of the Nation's acreage, the Reclamation West is fortunate that, before the countryside is covered by roads, buildings, and parking lots, Westerners have recognized man's absolute need for open spaces.

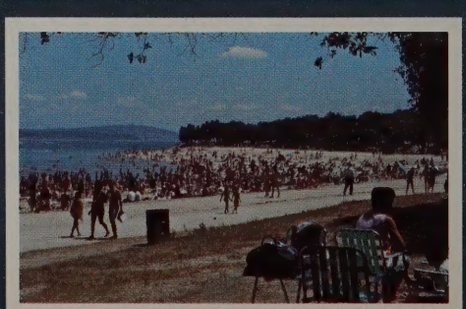
When the people conceive the idea of a Reclamation project for their locality they consider the role recreation can play in the overall development. And when the Bureau of Reclamation blueprints the proposed project it includes recreation as a purpose and benefit.

There is cooperation of more diverse interests in development of recreation than in any other Reclamation function. The Bureau seldom builds and operates recreation facilities on its projects. It cooperates with such Federal agencies as the National Park Service, the Forest Service, the Fish and Wildlife Service, state organizations such as game and fish departments, and various local agencies.

Outdoor Playground Plans Jell

The Auburn-Folsom South Unit, a major multiple-purpose development of the Central Valley Project, in an early stage of construction in California, promises to provide outstanding recreation benefits for that sports-





minded State. This will be possible because of an epoch-marking arrangement of the Bureau of Reclamation and the State of California. They have negotiated a contract calling for the state to share in the cost of recreation facilities and then to maintain and operate them at its own expense.

Under this Auburn-Folsom Recreation Plan, the state, the National Park Service, and the Bureau will build facilities at Auburn and Folsom reservoirs to meet the anticipated recreation needs during the first 10 years of project operation. Also, land is being set aside for additional space as it is needed, and details of fish and wildlife resources are being worked out with the U. S. Fish and Wildlife Service. This grassroots cooperative effort will bring healthful outdoor recreation benefits to an area already besieged by visitors. Folsom Lake on the American River is the most popular of all Reclamation reservoirs, a mecca for more than 4 million visitors a year. When Auburn Dam and its reservoir are built upstream, attendance at the combined outdoor playground will doubtless dwarf this impressive record.

1965 Act Spurs Recreation Activity

Many arrangements similar to the Auburn-Folsom Recreation Plan are anticipated under the Federal Water Project Recreation Act of 1965, which authorizes local participation in Reclamation recreation development. These not only will be for major projects, such as Auburn-Folsom, but also for small reservoirs dotted throughout the projects. For instance, a lease agreement has been negotiated with Franklin County, Wash., for developing and administering the Columbia Basin Project's Scooteney Reservoir for public recreation. The people of the county are undertaking to make the 1,100 acres of land, 600 acres of water, and 12 miles of shoreline into a model outdoor playground.

The Bighorn Canyon National Recreation Area, at recently completed Yellowtail Dam and reservoir on the Bighorn River in Montana and Wyoming, is one of the newest of Reclamation's Edens for outdoors buffs. In wild and rugged country which, during the last century, saw violent history made by Indians, U. S. cavalrymen, frontiersmen, fur traders, and prospectors, the 63,400-acre area offers fishing, swimming, and skiing on the 71-mile-long reservoir, and hiking and hunting nearby. One of the features is a visitor center overlooking the colorful canyon, and also the dam, reservoir, and powerplant, facilities of the multiple-purpose Yellowtail Unit of the Missouri River Basin Project.

Another visitor center recently was opened at Glen Canyon Dam on the Colorado River in northern Arizona. From this installation, operated jointly by the National Park Service, which administers the Glen Canyon National Recreation Area, and the Bureau of Reclamation, which operates the dam, powerplant, and reservoir, visitors view the spectacular canyon itself, as well as man-made features, including world-famous Lake Powell and Glen Canyon Bridge.

Hoover Dam, 370 river miles south on the Colorado, retains its Number One position as a tourist magnet as well as one of the world's most beneficial dams. More than 12 million people have toured the structure since it was built 32 years ago. About 61 million have visited the Lake Mead National Recreation Area, comprised of the dam, reservoir and adjoining acreage.

Recreation development is occurring virtually the length of the Colorado River, as the various cooperating agencies and private entrepeneurs open new facilities at Lake Powell, Flaming Gorge Reservoir in Utah and Wyoming, Navajo Lake in New Mexico and Colorado, Blue Mesa Reservoir in Colorado, at numerous participating projects of the Colorado River Storage Project, and on the lower river.

So it is on nearly all Reclamation projects in the West, with the local people taking the lead in initiating development of the recreational potentials and cooperating with government agencies to build and operate them.

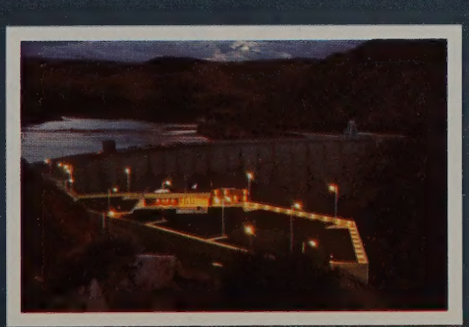
Conservation Corpsmen Contribute

The young men of the Civilian Conservation Centers operated in the West by the Bureau of Reclamation have contributed significantly to the development of recreational areas at the projects. They have accomplished millions of dollars worth of work in land clearing and landscaping, in fashioning and building public-use facilities, and in constructing trails and roads.

One of the outstanding achievements of corpsmen at the Collbran Center in Colorado constitutes a rare gift for a group of nature lovers whose recreational opportunities are inordinately restricted — the blind. Volunteering their free time, the young men helped build a nature trail for the sightless at Independence Pass near Aspen. The visitors walk along the path holding onto a nylon rope strung between posts. Braille-printed signs, made by the corpsmen, describe what the hikers are smelling, touching, walking over, and hearing.

Both the conservation program and the national beautification program have been generously furthered by these youths from all parts of the United States.

In line with the President's recommendations, beautification is being closely integrated into the Reclamation program. Transmission towers are being fashioned to



Reclamation is a whole montage of pretty pictures like these — boating, camping, swimming, or the beauty of a dam at night.

please the eye; power lines are being placed inconspicuously as possible, underground when feasible; project areas are being landscaped; structures are being planned to blend with the environment; signs are being made artistically attractive.

At the Grand Coulee Dam, where the third powerplant will soon take form as a 20-story edifice the size of four city blocks, a comprehensive environmental program is being formulated. A world renowned firm is designing the architectural features for the forebay dam, visitor facilities, the giant plant itself, and related installations; and numerous concerned agencies and groups, both public and private, are joining with the Bureau in preparing a master plan for developing the scenic and recreational potentials of the powerplant site and surrounding area.

The concept of injecting the creative talents of environmental and design architects into a major engineering-construction project originated with the Board of Artistic Consultants, a group of professionals who advise the Bureau. This constitutes an historic landmark in Reclamation planning.

The Bureau of Reclamation conducts an extensive research program, seeking new sources of water supply and new methods of conserving existing supplies. An important area of this research today involves weather modification studies. More than a score of universities, government agencies, and private research organizations are cooperating with the Bureau in the exciting "Project Skywater," which is aimed at inducing precipitation from clouds transporting large quantities of moisture. The goal is to augment runoff which could then be stored in reservoirs for release during dry periods. The Bureau anticipates that by 1978 a technology will have been developed for a nationally operational capability to increase precipitation an average of 10 percent.

Office of Saline Water

Many programs seek to develop and conserve precious water resources. But there are areas of the United States and throughout the world where, from a quantitative point of view, the only large-scale sources of additional fresh supplies are the oceans and inland brackish water bodies.

While scientists and technicians sought improved desalting processes as an increased source of pure water for the home, factory and farm, new methods received practical application by the Office of Saline Water (OSW).

A highly regarded addition to the field is the world's largest sea water conversion test unit — a multi-stage flash distillation process module. It is at the OSW San Diego Saline Water Test Facility in Chula Vista, Calif., also the site of the 1-million-gallons-per-day (mgd) Clair Engle desalting plant, completed in 1967.

The module is the first experimental desalting unit specifically designed to provide engineering and operating data for the multimillion-gallons-per-day desalting plants that will be required to provide fresh water supplies in some parts of the world during the 1970's. It offers engineers the opportunity to confirm essential data that will be used in the efficient and economical design, construction, and operation of very large desalting plants such as the 150 mgd Bolsa Island plant proposed by the Metropolitan Water District of Southern California.

The module will provide the necessary engineering developmental tools to bridge the gap in technology between today's 2.5 mgd plants and the huge "water factories" of the coming decade. Such mammoth plants offer the greatest opportunity to drive down the cost of producing fresh water from the sea and of providing economically a new source of water to meet burgeoning population demands.

Though it is only a slice of a 50 mgd multi-stage flash distillation process desalting plant, the module will simulate the operation of a full plant. A complete 50 mgd plant would have three 17.5 mgd units, with each unit composed of 39 stages. The module, consisting of nine stages using full-size components, will produce about 2.5 mgd. The California Department of Water Resources will deliver the desalted water of the module to the City of San Diego.

Part of the San Diego Test Facility, too, is the just-completed, large sea water pre-treatment plant designed to remove selectively some of the scale-forming salts in sea water. This pilot plant, utilizing a pre-treatment process known as "Lime-Magnesium-Carbonate (LMC)," operates in conjunction with the Clair Engle Plant. The process is essentially an adaptation of the familiar lime-soda ash process long used for softening fresh waters.

The LMC plant has sufficient capacity to pre-treat the feedwater for a flash distillation plant of 2 mgd. This is, of course, larger than needed by the Clair Engle Plant, but is ample to take care of future improvements in that plant and, more important, to permit a full study of the design parameters of the LMC plant itself.

The San Diego Test Facility, a 20-acre plot on property made available to the Department of the Interior by the San Diego Gas and Electric Company, will be the center of much experimentation in the immediate and long-range future.

For example, a test program for the Clair Engle Plant will require at least two years, and there is a tentative program reaching several years beyond. Intensive testing of the flash distillation module will be carried out as well, so that it may perform its primary function of providing design information for the Metropolitan Water District of Southern California plant.

Modifications Planned

Long-range plans call for future modification of the module to embody multi-level arrangements of the flashing brine passages. A second module employing the long vertical tube multiple effect concept is being de-

signed, and is tentatively scheduled for construction within the next two years.

Since the OSW program began in 1952, there have been significant advances in desalting technology at all levels: new processes have been devised in the laboratory; pilot plant studies are advancing new or improved processes toward commercial application; new operating techniques have been developed; new lower cost construction materials have been identified, and engineering techniques for building large plants have been tested and evaluated.

Current studies indicate that large dual-purpose electric generating and desalting plants, using present technology, could produce fresh water from sea water at a cost in the range of 35 cents per thousand gallons. In the 1980's, these plants may produce up to 1 billion gallons of fresh water daily for as little as 10 cents per thousand gallons.

Desalting Costs Reduced

In recent years, the cost of desalting has been reduced from $1.25 per thousand gallons to 85 cents per thousand gallons. This latter cost is being achieved in a 2.6 mgd plant at Key West, Fla. — the first city in the U.S. to turn to the sea for its regular municipal supply of fresh water.

But more important is the technology developed for multi-million-gallons-per-day plants such as the Bolsa Island Project and others to follow — in Israel, Italy, Spain, Hong Kong, Greece, and other locations as well. These plants would represent the lowest cost and most reliable source of fresh water supply.

Increases in cost estimates — from $444 million in 1965 to $765 million which covers anticipated escalation through the construction schedule — have temporarily delayed plans for building the world's largest sea water desalting plant. Bolsa Island has been ruled out and a search is underway for a new location.

The total project involves the construction of two nuclear reactors to provide steam to generate 1800 megawatts of electric power and also operate a 150 mgd desalting plant. Scheduled to be in operation in 1973, this plant would produce water for an estimated 35 cents per thousand gallons.

Processing Features Varied

The art of desalting features a varied array of processes, ranging from crystallization to distillation cycles and membranes. These include a liquid-solid-liquid phase change, liquid-vapor-liquid phase change, and liquid-liquid processes.

All commercial sea water desalting plants operating today throughout the world use a distillation cycle. These processes are expected to be the workhorse of sea water desalting for at least the next decade, and possibly longer unless an approach breakthrough occurs or an entirely new process is discovered.

Two types of membrane processes — electrodialysis and reverse osmosis — have been developed to the point where they are economically attractive for desalting inland brackish waters. Vast reserves of presently unusable saline waters, located in the north central and southwest areas of the United States, could be desalted to meet the multiplying demands for water.

Among achievements of longer range interest is the first successful laboratory demonstration of a pressure dialysis process. This new desalting technique differs sharply from the electrodialysis process by using simple pressure instead of an electric current to drive the salt ions through the membranes.

A secondary result from OSW research on glass membranes is that certain types of porous, hollow glass filaments have the ability to reject urea as well as salt. This finding holds particular interest for the National Aeronautics and Space Administration for receiving water from urine during prolonged flights by astronauts, and for the Federal Water Pollution Control Agency for treating sewage effluents.

In applying its most advanced technology, the OSW has sponsored development of a 2.5 mgd multi-stage flash distillation plant design to serve as a standard for worldwide construction of all types of desalting plants. The procurement package includes performance specifications covering materials, standards, codes, and workmanship — all to be used at the owners' discretion in building a plant of guaranteed performance and high quality. A two-part users' manual describes in detail the methods for selecting desalination plants in the range of 2.5 million up to 10 mgd of fresh water.

The world's largest sea water conversion test unit, at Chula Vista, Calif., gives engineers reams of desalination data.

The complete "Universal Design" package will be adequate for use by persons with only a limited knowledge of desalination systems. In short, the whole idea was to provide a flexible basis for a design that could be applied anywhere in the world to produce water at close to the minimum possible cost without the use of highly sophisticated techniques.

In its first application, the Government of Saudi Arabia has adapted the Universal Design for construction of a dual-purpose plant that will produce 50,000 kilowatts of power and 5 million gallons of fresh water

daily. Under construction at Jidda, the $17 million project is scheduled to be completed in early 1969. The plant will stand as a monument to President Johnson's mandate for sharing our desalting technology with other nations.

In a progress report to President Johnson earlier this year, Secretary Udall said:

"With your deep personal interest and direction and with the continued support of the Department's desalting program by the Congress, I am confident that the American scientific and industrial community working in partnership with the Office of Saline Water will continue the remarkable advances that have been made in desalting technology leading to the attainment of more efficient processes in the future."

Office of Water Resources Research

The Office of Water Resources Research (OWRR), sponsors a comprehensive cooperative program of research and training in the vital water resources field. Through this program the talents of scientists and engineers from more than 100 universities are concentrated on studies of critical water problems. Title II of the Water Resources Research Act of 1964, as amended, which became active during the year, brought additional research competence into the program. Establishment of a Water Resources Scientific Information Center aided nationwide information exchange.

The 51 state water resources research institutes approved under the Act have become recognized as effective centers for research and training. Resources planners, state agencies, and the public are turning to them increasingly for advice and information on water quality, planning, legislative matters, and other water problems.

The centers have statewide advisory boards, including representatives of public agencies, private industry, and informed laymen. This system encourages a grassroots approach to problem-solving and action programs. Many of the more than 600 current projects deal with water quality, planning, ecological impacts of water development, and recreational values.

Bonneville Power Administration

On an October day in 1805 the men of the Lewis and Clark Expedition, floating down the Columbia River, passed the mouth of the Snake River and arrived that afternoon at the first falls on the lower river. Next morning the men dragged their canoes around the first "pitch" and "let them down the rest of the way by cords."

The expedition's sergeant, Patrick Gass, who wrote those words in his diary, was not given to superlatives; nevertheless, in a rare show of emotion, he added:

"About the great pitch the appearance of the place is terrifying, with vast rocks, and the river below the pitch, foaming through different channels."

For many years after the explorers blazed the trail to the Northwest, the Columbia poured to the sea, just as it had for thousands of years, a wild uncontrolled torrent. But in the past 40 years, engineers and workmen have changed all that, often at the urging of local and regional groups which recognized that the dignity and appeal of the Columbia could be preserved while adding strongly to the economy of the basin it serves. Dams have been built, backing up the river into a series of long pools.

Water rising behind the dams covered the rocks and the falls, and the river was put to work for power, navigation and irrigation. The dams generate billions of kilowatt-hours of electricity. This power is carried to load centers by the Bonneville Power Administration. Barges move easily through slackwater where sternwheelers once strained mightily — and sometimes hopelessly — against the current. Irrigation projects water millions of acres, the verdant fields stretching in places as far as the eye can see.

Occasionally, a water skier skims the surface of a reservoir several fathoms above the spot where Patrick Gass helped line the canoes through a foaming chute.

Today, persons viewing the Columbia can scarcely visualize the river's appearance half a century ago when the runoff each spring transformed the river into the most awesome and violent stream in North America. Runoffs still occur each year, and the Columbia may never be tamed completely, but by 1973 man will be able to control a flood equal to the largest in the river's recorded history.

This river is the fourth largest in North America. The Mississippi, St. Lawrence, and Mackenzie are larger, but the Columbia easily outstrips them as a source of harnessed energy and in this sense is mightier even than the Amazon of South America. The Columbia and its tributaries have 30 percent of the hydroelectric potential on the continent. The watershed includes parts of British Columbia, Washington, Oregon, Idaho, Montana, Wyoming, Utah, and Nevada.

The river and its tributaries fluctuate greatly. At Revelstoke, B. C., the river's largest measured flow is 99 times greater than its lowest.

During the 100 years from 1858 to 1958 there were 13 major Columbia River floods. The four largest occurred in 1876, 1894, 1948, and 1956. The heaviest flow was in 1894, when warm rains melted a heavy snowpack; between April and September, 177 million acre feet of water poured into the ocean. This is almost as much water as the river discharges in an average year.

The peak flow in 1894 was 1,240,000 cubic feet per second, measured at The Dalles, Ore. The 1948 flood reached a peak of 1,010,000 cubic feet per second, destroying the community of Vanport on the outskirts of Portland, Ore.

Control of these floods has been sought by building

levees, mostly along the lower river, and by capturing the rampant waters in reservoirs. The goal has been to have enough reservoir capacity to reduce a flow at The Dalles from 1,240,000 to 800,000 cubic feet per second. Engineers are nearing that goal.

On January 29, 1968, bulldozers began pushing rocks and dirt into the last remaining gap through the earth-fill section of Arrow Dam. That afternoon they closed the channel. It was the first time the Columbia had been dammed in Canada. The river began flowing through discharge works in the concrete section of the dam off the north bank.

Arrow Dam has since been completed. The Canadians bested by several months the April 1, 1969, deadline specified in the treaty between their country and the United States. Thus, Canada has finished two of the dams she promised to build — Duncan and Arrow. Duncan, at the outlet of Duncan Lake on the Duncan River, adds 1.4 million acre feet of live storage capacity, and Arrow, 7.1 million acre feet.

When the third Canadian project, Mica Dam on the Columbia 90 miles above Revelstoke, B. C., is completed, the storage built by Canada under the treaty will total 15.5 million acre feet. Mica is to be finished by April 1, 1973.

Downstream Potential Increased

Besides helping control floods, the projects will increase the amount of power that can be generated at downstream plants in the United States. The two countries are dividing this additional capacity equally, and Canada has sold her share to purchasers in the United States for 30 years.

The treaty also permitted the United States to build Libby Dam on the Kootenai River in Montana. Its reservoir will extend 42 miles into Canada. Libby will add 5 million acre feet of storage. The four treaty projects will about double the storage capacity available in the river basin.

The construction of Duncan, Arrow, and Mica Dams in Canada, together with Libby in Montana and Dworshak Dam now underway in Idaho, will give us enough reservoir capacity to control a flood as large as the one that hit in 1894.

Harnessing Almost Completed

While man is taming the river with storage projects, he also is concluding the task of harnessing its power with hydroelectric projects. In 1968, the U. S. Army Corps of Engineers completed John Day Dam, which eventually will have a generating capacity of 2,160,000 kilowatts. Only one more U. S. site on the river remains to be developed. This is Ben Franklin, upstream from McNary Dam. Generation, however, will be added to several projects, including the Grand Coulee Dam, where the third powerhouse, now under construction, will raise the capacity of that project to 9.2 million kilowatts.

The Bonneville Power Administration now markets power from 24 projects, with a total generating capacity of 7.5 million kilowatts. In addition, BPA "wheels," or exchanges over its grid, more than 5 million kilowatts for non-Federal utilities.

To transmit this electricity, BPA operates more than 11,000 circuit miles of high-voltage transmission lines and 300 substations. They comprise the world's largest network of long-distance, high-voltage lines.

During 1968, BPA energized more than 750 miles of line, much of it at 500,000 volts. Before another 10 years pass, BPA will have about 3,000 miles of 500,000-volt lines in operation.

Construction of the Pacific Intertie interconnects BPA's grid with utilities in 12 states. The two 500,000-volt lines of the Intertie are carrying power back and forth between the Pacific Southwest and the Pacific Northwest. In April 1968, electricity from the Northwest surged into California at the rate of 600,000 kilowatt-hours a day to pump water from northern California over the Tehachapi Mountains.

Last spring in Central Oregon, towers began going up for the first 750,000-volt direct-current transmission line for the Intertie. This line began operating at half capacity early in 1968, in time to tap high flows of the Columbia River. After three months, the line is to be shut down, the terminals completed, and the line readied for full operation in December 1969.

BPA is building 265 miles of the direct-current line through Oregon to the Nevada border. There the line connects with the section being built by the City of Los Angeles.

BPA began building the northern terminal, the Celilo Converter Station, near The Dalles, in 1966. Here alternating current will be converted to direct current and sent south. When power flows north, Celilo will convert the flow to alternating current and feed it into the BPA grid.

Celilo sits on a high bench which, fittingly, overlooks the Columbia.

After the four major lines of the Intertie are built, they will be able to carry more than 4.5 million kilowatts north or south.

The Intertie, when complete, will represent an investment of $660 million, with $273 million coming from private utilities, $298 million from the Federal Government, and $89 million from the City of Los Angeles. BPA's share of the Federal cost is $167 million, and the Bureau of Reclamation's, $131 million.

In the next 50 years the Intertie will return benefits estimated at $2.6 billion.

BPA's grid, which contains 80 percent of the high-voltage transmission capacity in the region, serves all the utilities in the Northwest. This arrangement permits the use of larger lines with all the attendant economies.

The grid also contributes to the reliability of the separate distributors' systems by supporting them with the enormous resources of the U.S. Columbia River Power System.

And it holds to a minimum the impact of transmission lines on the environment. This is important in the

Northwest, where many of the lines cross scenic areas. For example, one 500,000-volt line carries four times as much power as a 230,000-volt line, yet its 150-foot right-of-way is only 25 feet wider than that of a 230,000-volt line.

This backbone grid will help the region meet its growing electrical requirements. The "firm" energy load will almost double in the next 10 years, increasing from 10 million kilowatts in 1968 to 18 million kilowatts in 1978 and to 30 million kilowatts by 1988. The region's peak loads are expected to increase from about 15 million kilowatts in 1968 to more than 30 million kilowatts in 1978 and to 50 million kilowatts in 1988.

Southeastern Power Administration

Southeastern Power Administration (SEPA) markets from 14 U.S. Army Corps of Engineers projects to 153 preference customers (88 rural electric cooperatives, 64 municipalities, and 1 State agency), as well as 5 privately-owned power companies and the Tennessee Valley Authority. These customers are in Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, and Kentucky. Contracts also have been arranged for future delivery of power to generation and transmission cooperatives in Indiana and Illinois. The preference customers of SEPA serve an estimated 4 million people, most of whom live in rural areas or in small towns.

Additional Corps' projects soon to be in operation, including the Percy Priest project in Tennessee and the Millers Ferry project in Alabama, are expected to increase materially the number of customers served by SEPA and to expand the area affected by its operations.

SEPA's revenues of approximately $31 million for the year came from the sale of electric power from plants having a total installed capacity of 1.8 million kilowatts.

Southwestern Power Administration

The true grassroots concept of serving the public must include the public's voice in decisions and policies — and the Southwestern Power Administration (SWPA) follows this theme in its service area which includes all or parts of Oklahoma, Arkansas, Missouri, Kansas, Texas, and Louisiana.

The Southwest Municipal Advisory Council, the Southwest Advisory Committee (a Rural Electrification Administration group), and statewide associations of municipalities and REA's met throughout 1968 with SWPA representatives concerning Southwestern's sale of 4.4 billion kilowatt-hours of electricity, much of which came from Federal hydroelectric plants feeding SWPA lines.

Gross revenues from this electricity reached $32 million during 1968, thus helping assure that 40 percent of the cost of building the Federal flood control-power-navigation works by the Army Corps of Engineers will be repaid to the U.S. Treasury.

The energy flow from SWPA lines to REA cooperatives jumped to 43 percent in 1968. Other consumers included aluminum companies and private utilities, 37 percent, municipalities, 15 percent, and other governmental installations, 5 percent.

Alaska Power Administration

To promote the development and utilization of water, power, and related resources of Alaska, the Alaska Power Administration (APA), which has headquarters in Juneau, has received the following assignments: To take over all functions formerly performed by the Bureau of Reclamation in Alaska; to operate the 30,000-kilowatt Eklutna Project near Anchorage, the 70,000-kilowatt Snettisham Project near Juneau, when completed in 1972, and future Federal power facilities in Alaska; and to market the power and to prepare feasibility reports on future water and power projects. By agreement, the U. S. Army Corps of Engineers constructs any projects recommended by APA.

APA is coordinating for the Water Resources Council's planning of a comprehensive framework study of Alaska water and related land resources. It has proposed a U. S.-Canada study of the potential Yukon-Taiya hydroelectric project involving the flows of the upper Yukon River, is planning an Anchorage-Fairbanks electrical intertie, and will advance other proposals for developing and interconnecting new power sources.

Mineral and Fuel Resources

"Who would hesitate to share his inheritance with his descendants? The present generation can take satisfaction in conservation laws that provide insurance for future generations against despoilment of an environment by thoughtlessness or selfishness. Only if we protect our natural resources do we give proper honor to their gracious Donor."

Congressman John P. Saylor
Pennsylvania

Mineral and Fuel Resources

Conservation of precious resources, both human and mineral, means Bureau of Mines personnel are on fulltime 'alert' to make jobs safe and to stretch mineral wealth. Fire survival (left) and blast furnace work (right) are constant proving grounds

Bureau of Mines

Beneath the land lie the minerals on which our civilization depends: sand, gravel, and stone for building; phosphates and potash for fertilizing croplands; iron ore for making steel; fuels for heat and power; and many other essential raw materials.

Minerals and fuels are indispensable to many local and regional economies and to the national economy as well. They support directly the production of goods and services representing about 40 percent of our gross national product; indirectly, minerals and fuels are the basis for nearly 75 percent of the GNP.

These vital substances are non-renewable. Even when domestic deposits are enormous, they still are limited and ultimately will be exhausted. We are consuming these irreplaceable resources at steadily increasing rates because there are ever greater numbers of us to feed and to clothe, to transport, house, and keep warm.

Helping to conserve and stretch our limited resources . . . encouraging their wise and efficient use for the benefit of all our people . . . is a major mission of the Interior Department's Bureau of Mines.

The conservation of irreplaceable resources has been the Bureau's goal ever since the agency's creation nearly 60 years ago. Emphasis at first was on conserving human resources — the lives of the workers who brave the hazards of mining to extract the Nation's mineral wealth. But the Bureau's goal soon broadened to embrace the conservation of the minerals themselves. Today, in addition to mine safety and health, Bureau programs include research in mining, metallurgical, and fuels technology; the economic evaluation of mineral deposits; and the collecting and publishing of information on minerals and

mineral industries for government and public use. A logical extension of these activities has been the Bureau's growing concern with mineral-related problems of air, water and land pollution.

The Bureau of Mines employs some 4,500 people, more than half of whom are skilled in one or more scientific or engineering disciplines. These employees are stationed at approximately 40 locations throughout the country where they work closely with other people, in the mineral industries, in mining schools and universities, in state and local governments, helping to solve local problems at the local level. At the same time they are building a national understanding of, and a national capability for, mineral conservation.

Examples of this grassroots approach to conservation of resources that sustain life, health, and economic progress can be found in many places:

— In eastern Kentucky, a "classroom" built on a 12-ton truck chassis labors up a rugged mountain road to a small coal mine. There, a dozen or more miners get a half-day course — given by a Bureau expert — in the safe use of explosives.

— On a downtown street in a Pennsylvania city, a Bureau engineer and his counterpart from the state Department of Mines and Mineral Industries consult a map of old, abandoned mine workings deep below them. They are deciding on the best location for drilling a borehole, through which a slurry of mine wastes and water can be flushed to fill underground voids left when coal was extracted long ago. When their job is done, the layers of rock and shale surrounding the voids will again have the support they need. The street and buildings on the surface will be protected against the slow and subtle menace of subsidence.

— Off the coast of Oregon, seagoing mining engineers take samples of sediment from the ocean bottom, 50 fathoms beneath the keel of a Bureau research ship. Some of the engineers work for the Bureau of Mines; others are observers from half a dozen private companies which help support pioneering Government research in undersea mining in return for the knowledge and experience they obtain. The objective is to develop practical methods for sampling and mining valuable mineral deposits of the Continental Shelf. In this way, government and industry work together at all levels to expand the Nation's resources of essential raw materials.

— At a Reno, Nev., research center, scientists and engineers proceed with pilot tests of a new Bureau process that promises economic recovery of gold from low-grade ores that are abundant in Nevada and adjoining states. If they succeed, mineral deposits now worthless may yield as much as $1 billion worth of gold in Nevada alone.

— At another research center, this one on a college campus in Maryland, other Bureau technologists are experimentally "mining" residues from trash incinerators that ring the Nation's capital. The objective here is a commercially feasible process for extracting from the worthless-looking incinerator sludge such metals as iron, aluminum, copper, and lead. The sludge can be called a man-made ore, richer in metal values than many natural ores now mined profitably. Bureau metallurgists have found that even the fly ash from incinerator smokestacks contains significant amounts of silver and gold.

Such examples occur hundreds of times at many different places in the course of a year. They represent action at the local level, by individual Bureau workers cooperating with other workers to attain a common goal: Mineral conservation.

Among the dramatic programs of the Bureau is its expanding effort to restore areas suffering from the effects of mining operations that have long since ended. This

Here, in the Bureau's "classroom on wheels," a group of Kentucky miners listens attentively to instructions in the safe use of explosives delivered by a Bureau of Mines instructor.

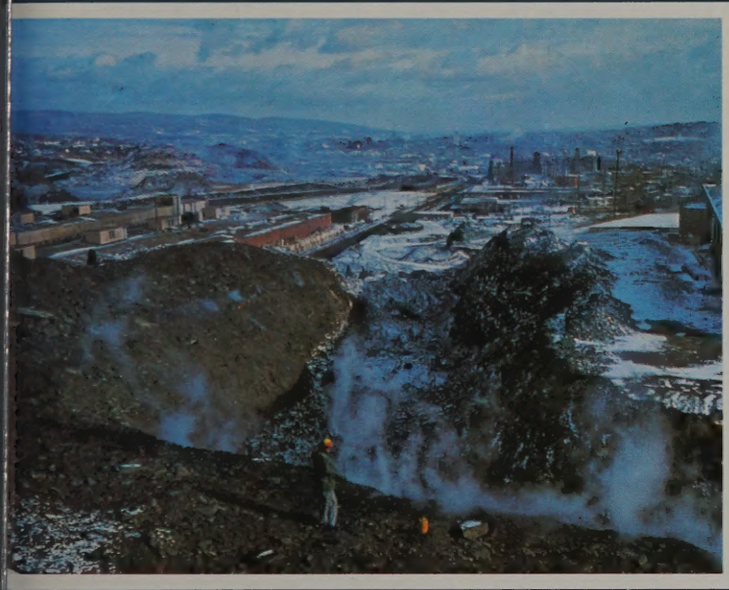
program, conducted for many years on a modest scale, has been accelerated under the Appalachian Regional Development Act of 1965, which provides for Federal support of up to 75 percent of the cost of restoration projects.

Bureau of Mines activities under the Act involve three kinds of projects: controlling fires in abandoned coal mines; preventing the settling, or subsidence, of the surface over mined coal beds; and reclaiming lands that have been surface mined for coal. Each project, regardless of kind, is unique. Each demands that Bureau engineers work closely with people in the project area.

In Scranton, Pa., for example, the control of an abandoned coal mine fire that threatened a large section is

now proceeding swiftly, but only after many months of hard work and cooperative effort by local, state, and Federal agencies. Control plans must be carefully engineered, rights of way and other legal permissions must be obtained, and local sources must find and provide materials needed in the work — for instance, sand, slag, fly ash, and similar substances that sometimes are injected through boreholes into old workings to smother the fire.

At times, the cooperation of individual citizens in such an effort involves real sacrifice. At Scranton, 55 families had to evacuate their homes, some because of noxious fumes from burning coal seams and some so that control work could proceed.



Sand-filled trenches may contain this underground coal fire, burning in Scranton, Pa., (left) since 1965. Bureau men (right) sample water at mine opening for acid drainage signs.

The effort to end the threat of this particular fire required as a first step the digging of a massive trench between the burning zone and the threatened residential section. That trench, nearly half a mile long and 30 feet wide at the bottom, reached the floor of one burning coal bed in the spring of 1968. Now the trench is being deepened to reach a lower coal seam that also is afire. When completed, probably to a total depth of about 135 feet, the whole trench will be filled with non-combustible material to make a fireproof barrier, isolating the fire from the populated area.

Before the control job is finished some 2.6 million cubic yards of material will have been moved, and the surface of the land will have to be regraded to normal contours after the trench is filled. The city is supplying material for the fire barrier, as well as millions of gallons of water needed to wet down and cool the burning coal exposed as the trenching progresses. The State is paying 25 percent of the project's total cost, which could be as much as $4.5 million, and engineers from Pennsylvania's Department of Mines and Mineral Industries have cooperated with their Federal counterparts from the beginning.

Also contributing substantially to the effort are local housing and health authorities and the Scranton Fire Department. Completion of the project will mean the protection of thousands of people, and of public and private property valued at many millions of dollars.

Lives and property also can be threatened by another side effect of past mining: the settling, or subsidence, of ground deprived of its natural support when coal was extracted long ago. This menace, too, is now being combatted cooperatively and effectively by Federal, state, and local agencies under the Appalachian Act.

Typical of the benefits accruing from the Bureau's expanded attack on subsidence is the story of a project completed in Wilkes-Barre, Pa. There, the appearance of cracks in the wall of a high school stadium was among the first of several signs that the surface in a heavily populated part of the city was beginning to settle. Inspection of old anthracite workings underlying the area showed that pillars of coal, left for support when the

workings were abandoned, were beginning to crumble.

State and local agencies devised a plan for filling the old mine voids with material that would reinforce the weakened pillars, and the proposed project was reviewed by Bureau engineers and approved for financing on a cooperative basis.

Fill material, supplied by the city from a nearby mine refuse dump, was crushed to pebble size and then flushed with water through holes drilled from the surface into the mine passages below. Underground piping carried the fill throughout the old workings, where special barriers had been built to retain it while letting the water drain away. With the project's completion, an unsightly mine refuse dump on the surface had been moved underground where it remains today, providing needed support for the earth and rock surrounding the old mine.

Realizing the necessity for forestalling subsidence wherever possible, Bureau engineers now are using sensitive, stress-measuring instruments to detect areas that may be threatened. In this way remedies can be applied before the damage begins to show on the surface.

Eradication of the scars left by past surface mining in parts of Pennsylvania's Moraine State Park exemplifies the third kind of grassroots conservation project now being accomplished on an expanded scale under the Appalachian Act.

Working together, Bureau and state engineers devised a plan for restoring nearly 200 blighted acres to make them as attractive as the rest of this new 3,200-acre public recreation facility. Waste piles left by mining were plowed into the ugly open pits and the surface was regraded to natural contours. Other ugly banks were covered with earth and planted with grass, shrubs, and small trees that now are flourishing on the gentle slopes. One rocky highwall, created when the earth around it was stripped away to get at the coal seam, has been left to provide a scenic lookout for an area that is now worth seeing.

These examples represent nearly a score of projects that have been completed or are in progress as a result of the Appalachian Act. They will benefit millions of Americans and will safeguard property that is worth more than $1.5 billion.

Act Urges State Regulations

Less costly than curing the ills generated by past mining is their prevention. Recognition of this fundamental truth, and of the fact that surface mining — with the advantages it offers in safety and economy — will be practiced increasingly for the foreseeable future, underlay the Administration's proposal for a Federal "Surface Mining Reclamation Act of 1968."

Under this proposed legislation, strongly endorsed by President Johnson and Secretary Udall, the Nation's 20,000 active surface mines would be operated in accordance with the conservation ethic. All mining states would be encouraged to adopt regulatory practices thus far adopted by only few, and all surface-mine operators would be stimulated to follow the example now being set by the most progressive mining companies.

The legislative proposal followed closely the completion of a Bureau-coordinated study of current surface mining practices, and its provisions reflect many of the Bureau's findings. Passage of the recommended law would assure the annual reclamation of approximately 150,000 acres of land, the amount now disrupted each year in surface mining for all minerals.

Still another approach to the prevention of land damage by surface mining is being taken by the Bureau of Mines in its research. The ultimate aim is to reverse the current trend toward surface operations by making underground mining safer and economically more attractive. The approach is called "total systems," in which the separate, and therefore inefficient, phases of underground mining as now practiced would be integrated into a single continuous operation including rock breakage, haulage, tunnel support, and control of the mining environment.

Support for this systems approach came during 1968 in the form of a report on a study made under contract

by an independent engineering firm. According to the report, intensive development of the technology essential to a rapid underground mining system could, within two decades, yield benefits to the national economy totaling more than $10 billion. More than half of this would accrue through reductions in the cost of extracting minerals from the earth which, in turn, would permit access to deeper mineral deposits. The rest would result from "spin-off" advances in the underground placement of urban and inter-city transport and communications systems, water and utility lines, and waste disposal facilities.

Surface Wastes Go Underground

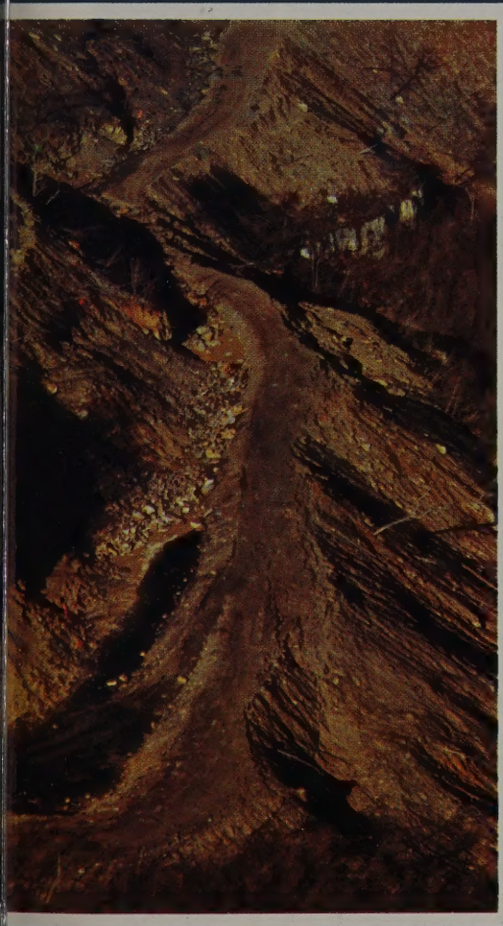
Disposing of mineral wastes underground will result in less of the land's surface being cluttered with mountains of mining and milling refuse. But it will not recover the substantial mineral values that remain in many of these waste piles. The needless loss of such values becomes less and less tolerable as population and our requirements increase.

Some of the waste piles already have been turned by industry into sources of additional mineral wealth. The tailings, or wastes, from the milling of copper ores are leached, for example, with a chemical solution to capture copper that eluded recovery in the mill. Now, Bureau metallurgists have found a way to convert the used leaching solution into a mineral resource.

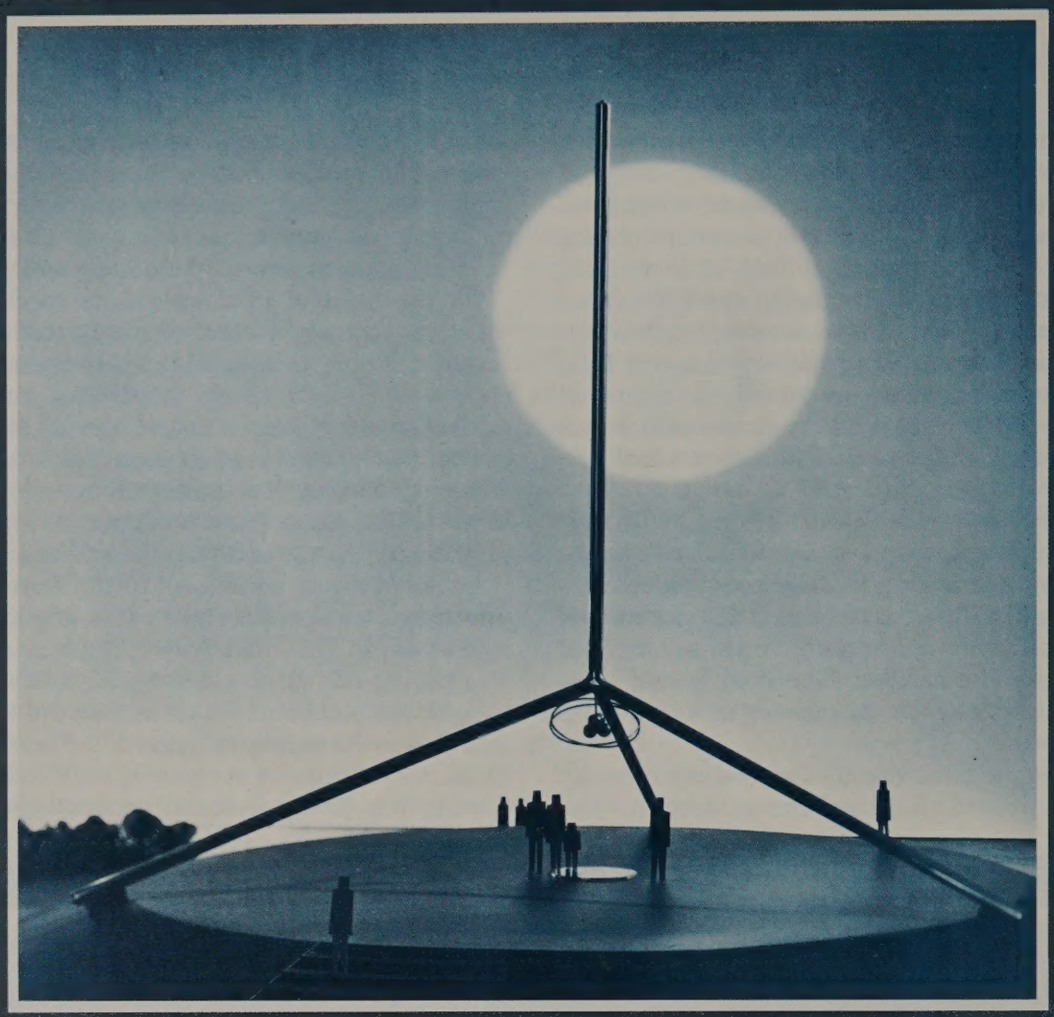
On the basis of pilot-scale tests conducted recently with industry, application of the Bureau process to the waste solutions at domestic copper operations could be expected to yield about 2,000 tons annually of the nuclear reactor fuel, uranium oxide, plus substantial amounts of yttrium, a rare-earth element used in electronic equipment. Yet another Bureau process promises to make the same waste solutions an economic source of alumina, the raw material for aluminum metal.

Other research, performed by the Bureau itself or by universities and private firms under grants and contracts authorized in the Solid Waste Disposal Act of 1965, is also paying off. Recent accomplishments include:

— Development of ways to convert mineral wastes into paving materials, aggregates for brick and concrete block, soil stabilizers for use in road building, and soil conditioners for agricultural applications.



States could prevent land wounds like this ugly strip operation (left). Mine tailings (right) often yield new wealth the second time around.



This four-branched time column at Amarillo, Tex., symbolizes the foresighted conservation action needed for our future.

— Discovery of significant amounts of gold and silver in fly ash from municipal incinerators, and successful experiments in recovering iron, aluminum, and other metals from incinerator residues.

— Invention of a process that "sweats" valuable copper out of small scrap items until now believed too costly to reclaim.

— Use of the crushed hulks of discarded autos as strengthening cores for concrete structural forms.

— Advancement of a process promising recovery of scarce sulfur by cleansing the air pollutant, sulfur dioxide, from industrial stack gases.

— Conclusive demonstration that the waste of resources inherent in air pollution from automotive-exhaust gases can be reduced substantially by effectively applying available technology.

Grassroots Safety Promoted

Safe and healthful working conditions in mineral-industry operations are most effectively promoted, achieved, and secured at the grassroots level. Consequently, the Bureau's mine inspectors and safety engineers work closely with individuals at the mines and plants extracting and processing the Nation's mineral wealth, and with individual manufacturers of specialized mining equipment to help assure safety in design and operation.

Safety education offered by the Bureau is designed to instill in mine workers and mine officials an abiding awareness of the inherently hazardous nature of their jobs and a sense of responsibility for their own safety and that of fellow workers. These twin objectives are stressed in a variety of training courses in accident prevention, first aid, and mine rescue . . . courses given each year by experienced Bureau instructors to thousands of mineral industry employees. Additional thousands receive special short courses in electrical and haulage safety and in fundamentals of mine-roof control.

All courses are continuously reviewed and revised to assure that they remain up-to-date and effective supplements to the periodic safety inspections made by Bureau personnel of all domestic mining operations. Conversely, the findings of Bureau mine inspectors are valuable guides in determining the points to emphasize in particular courses at particular mines.

Inspection findings serve, too, as an important basis for recommendations the Bureau makes to improve the

Federal Coal Mine Safety Act. That legislation, originally enacted in 1941 and amended in 1952 and 1966, now applies to all domestic coal mines. On the basis of its experience in administering the Act, the Bureau in 1968 made 18 major recommendations to the Congress for strengthening its safety provisions.

At the same time, Bureau inspectors were acquiring valuable experience in administering recent safety legislation covering work practices and conditions at noncoal mines. Thus far, compliance by operators of such mines with the recommendations of Federal inspectors is wholly voluntary. But during the year committees of experts, appointed by Secretary Udall to advise him concerning provisions of the law that should be made mandatory as well, made steady progress towards completing their exacting task.

Human life is the most precious, and among the most perishable, of any nation's resources and, in the United States, the necessity for conserving life is widely and readily acknowledged. In this land of abundance, however, the importance of conserving other natural resources has not always been seen . . . at least not in time.

Until recently Americans could not imagine there being an insufficiency of clean air to breathe or pure water to drink. Always there have been thick stands of timber and rich crops for harvesting; multitudes of wildlife, thousands of fish-filled streams, and miles of beaches and parklands for recreation; a seemingly inexhaustible supply of minerals and fuels to support industrial and economic growth; and living space unbounded.

Now, an awareness that our natural resources are not unlimited, that we may not always have enough of everything, has begun to spread among us. The warnings of our conservation prophets once again are ringing in our ears. Still, the habits of the past cling tenaciously; new ways of thinking — new appreciations of reality — must be nourished and encouraged to grow. And grow they must, that we may learn to practice conservation on other than a piecemeal, remedial basis.

Helium Centennial Year Set

Conservation, we are beginning to realize, must become action, not reaction. It must be founded on foresight, not hindsight. Our realization of this truth must be fed and nurtured at the grassroots level until it becomes a prominent and enduring feature of our culture.

That is the objective of a national "conservation-consciousness" program launched by the Bureau of Mines late in 1967 and destined to continue through 1968. To convey to all Americans the ideal of a new and forward looking conservation ethic, the Bureau and other agencies have joined with industry to celebrate a year-long Helium Centennial.

Atlhough it is a valuable and versatile element, helium's remarkable potential for beneficial use went unrealized for many decades after its discovery a century ago. Moreover, as has happened with other natural resources, our limited reserves of helium were needlessly wasted for many years until Congress, impressed with the need for assuring future supplies, enacted legislation permitting helium's large-scale conservation.

The Helium Centennial was inaugurated by Vice President Hubert Humphrey late in 1967. It was celebrated widely during 1968, with special events at major scientific meetings, with an essay contest in which the Nation's youth proposed far-sighted conservation programs for other natural resources, and with the construction and dedication of a special monument at Amarillo, Tex., in the heart of the country's helium producing region.

Thus, helium will provide a nationwide example of the kind of conservation that must be practiced increasingly to guarantee adequate resources for ourselves and those who will follow us. By emphasizing that example for all Americans, the centennial hopefully will strengthen the spirit of the new conservation now beginning to take hold throughout our land.

Office of Coal Research

Remote as it may be from parklands and sparkling streams, the Office of Coal Research (OCR) nevertheless has a significant role in bettering the environment. Contract efforts it supports promise side benefits in reducing or eliminating air and water pollution.

Through OCR contracts, pilot plants have been built to use coal in treating sewage — and then salvaging the coal-sludge material to power industrial units. Another project uses fly ash, reclaimed from stack gases of coal-combustion equipment, for making brick and other construction items. Economic conversion of the ash provides an incentive to install more effective ash-collection equipment at industrial plants, thus lessening the contamination of the air we breathe.

Computer mining systems, developed under an OCR-supported project, now are used by 34 companies in 8 States to improve efficiency and output of coal as well as potash and other minerals.

During 1968, OCR supported 29 research studies, including several for converting coal to gas and to liquid fuels, thereby reducing air and water pollution. OCR reports that a synthetic fuel industry based on coal, and consisting of 10 plants, can be envisioned by the year 1980. Such an industry would return $150 million a year in taxes alone, and broad social and economic benefits.

Office of Minerals and Solid Fuels

The Office of Minerals and Solid Fuels is responsible for emergency preparedness activities of the Department for minerals and solid fuels. The office continued to develop plans and programs to assure an adequate supply of these resources to meet military and

essential civilian requirements under any type of a defense emergency.

The office has been coordinating research and assisting in developing incentive programs to expand the supply of materials to meet the needs of a growing economy and the requirements for defense mobilization.

Office of Oil and Gas

The Office of Oil and Gas has, from its establishment in 1946, been a grassroots communication channel between the Federal Government and state petroleum conservation agencies, the Interstate Oil Compact Commission, and the petroleum industry. As an advisory agency to the Secretary of the Interior on oil policy, the Office of Oil and Gas keeps in close touch with the conservation programs, plans, and problems of 32 oil-producing states and an industry consisting of over 10,000 corporate and individual operators engaged in producing, transporting, and processing oil and natural gas.

In wartime, the ready availability of natural gas and petroleum products becomes of critical importance, and demands a highly trained, standby organization, to mobilize these resources quickly. Such an organization is the Emergency Petroleum and Gas Administration (EPGA), recruited, trained, and maintained in readiness by the Office of Oil and Gas. In the event of nuclear attack, the EPGA is specifically planned to function as a grassroots control network to insure maximum benefit from the Nation's petroleum resources. During the past year the EPGA state of readiness continued to improve through exercises held at both regional and national levels, and by the staffing of 90 percent of its key executive positions.

Oil Import Administration

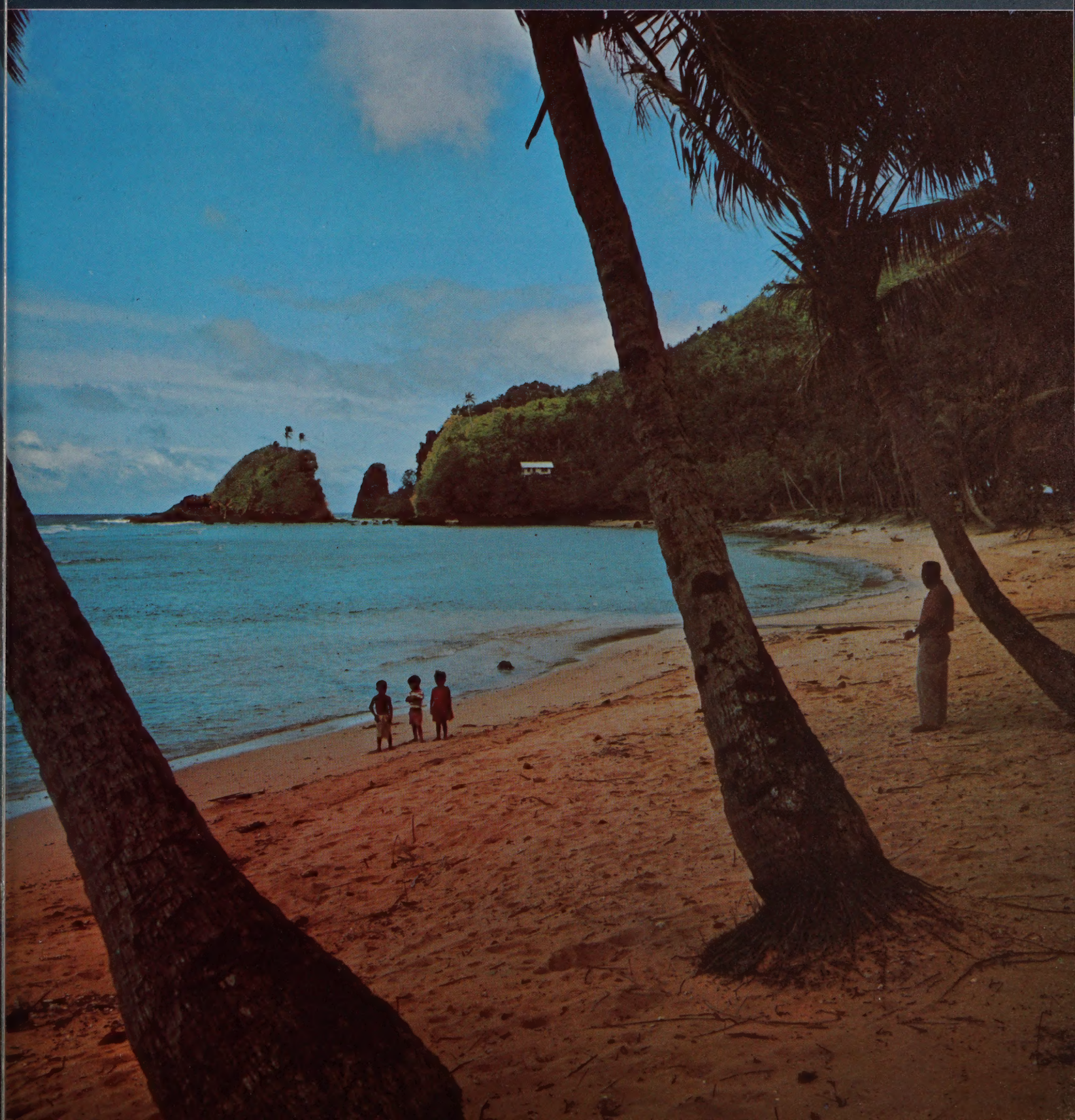
Energy sources are among the most vital natural resources contributing to the living standard and national security of any nation. In the United States oil and gas account for approximately 70 percent of this energy. The people of the United States used 4.2 billion barrels of petroleum products in 1965, and economists estimate they will use 6.6 billion barrels in 1980. Imported oil currently contributes about one-fifth of this quantity.

The mandatory oil import control program, administered by the Department of the Interior, was established by Presidential Proclamation on March 10, 1959, after a finding that the level of imports threatened to impair the national security. This program restricts importation of petroleum and its products. The objective is to maintain a healthy domestic industry, capable of exploring for and developing the new reserves needed for the future well-being of our people and security of our nation.

Human Resources

"Surely we are wise enough to recognize that man needs more than the steel and concrete environment of urban civilization to fulfill his natural role here on earth. He must also have the sanctuary of unspoiled land, a place of solitude where he may turn his thoughts inward. He must have the opportunity to wonder at the miracle of creation."

Senator Alan Bible
Nevada



Human Resources

A foot in the past and another in the future — proud American Indians recreate their rich dance heritage at Santa Fe Institute of Indian Art, while Navajos (right) hold jobs in electronics.

Bureau of Indian Affairs

The only source of real wealth is man at work converting nature's resources for the good of man.

"Grassroots conservation" is no more than a phrase adrift in the limbo of sloganeering unless anchored to the individual and collective needs of man.

American Indians, who own more than 2 percent of this country's land, present a classic example of how sometimes a "culture of poverty" can materialize alongside a grassroots land-development program.

The Government's efforts over the decades have put land above people in the application of land-management programs for Indians. A case in point was the 1887 Allotment Act. It attempted to turn nomads into farmers by giving Indians individual plots of land, reflecting the land-development policy of the United States without recognizing the culture conflict this policy imposed on Indians.

The preservation of Indian tradition and fostering of Indian pride had little weight in the administration of Indian affairs over the years. Indians have clung to their Indian-ness as a form of self-defense.

Very early in time the Indians of this country saw the destruction of their balanced, albeit primitive, economy, and, consequently, the destruction of a society in which the man-and-land way of life prevailed.

The Indian spirit withered as first the people were forced to limit their wanderings and relinquish their use of some of America's most fruitful lands; then hunted down if they resisted; then sheltered as wards and subjected to the dubious largesse of the public whim; then

urged to settle down and make farms out of their deserts and rocky parcels of prairie; then told to join the throng, move to the cities, take jobs in the factories; then asked: why don't you think of these things yourselves, be like the rest of us, and take a bite from the apple of affluence?

The wry comment of one Indian leader sums up the Indian response and explains his continuing attitude of non-involvement: "It it not our problems that give us the most trouble," said he. "It is your solutions."

The essence of the Indian plaint focused on the unmet needs of the Indian spirit. You have deprived our children of appreciation of their heritage in the name of mass education, they accused. You have convinced yourselves that we are incompetent, they charged, and many of our own have been reduced to believing it.

Who Decides for the Indians?

What the Indian needs is better schooling and more commercialization of their resources, the administrators of Indian affairs decided. New schools were built; new roads were cut through wilderness areas to link the isolated Indian families with the rest of America; hospitals and mobile clinics fanned upward and outward in Indian areas; the Nation's big industries began to demonstrate an interest in expanding to the Indian labor markets; new irrigation projects on Indian lands were started and demonstration farms and ranches created; public housing aid was extended to Indian tribes and thousands of new homes began to rise on the site of shacks and shanties.

Most of these activities started less than a decade ago, and the faces of some Indian reservations are changing for the better.

It Didn't Feel Like Home

But the *culture* of poverty — the poverty-oriented outlook — is more difficult to dispel than are the overt signs of deprivation. Indian leaders, even while approving the new economic and social thrusts, reflected the uneasiness of their people and interpreted continuing passivity in this way: The houses are nice, but we did not design them ourselves and they do not feel like home; the school buildings are splendid, but we do not understand what you are teaching in them; industry brings us jobs, but they are not *our* industries even though they occupy our lands. Why do you not help us do the planning for ourselves?

The betterment program had not seeped down to the people's roots. The views of Indian men and women had not figured large enough in land-use planning.

Indian Needs Dramatized

Then, two years ago, on the recommendation of Secretary of the Interior Udall, President Johnson appointed an Indian to head the Bureau of Indian Affairs (BIA).

One of the first official acts of the new Commissioner was to travel the length and breadth of Indian country, through 26 States, visiting hundreds of tribal groups. The shrouds were torn from the trouble that lay deepest and longest buried. The need for Indian involvement in Indian affairs, the need for an Indian voice to determine Indian destiny, was dramatized. At that point, the Bureau accelerated its metamorphosis from caretaker to cooperative partner with the Indian people.

To reaffirm the Administration's commitment to social and economic justice for Indians, President Johnson sent an unprecedented message to Congress on March 6, 1968. Calling for a $500 million outlay in 1969 for education, job training, economic development and improved health services for the Indian minority, the President said:

"I propose a new goal — a goal that ends the old debate about 'termination' of Indian programs and stresses self-determination; a goal that erases old attitudes of paternalism and promotes partnership self-help.

"Our goal must be: A standard of living for Indians equal to that of the country as a whole; freedom of choice — an opportunity to remain in their homeland, if they choose, without surrendering their dignity, and an opportunity to move to the towns and cities of America, if they choose, equipped with skills to live in equality and dignity; full participation in the life of modern America, with a full share of economic opportunity and social justice. . . ."

In one sense, the partnership concept does bring to a close a chapter of Indian history. Paternalistic administration of Indian affairs, with the BIA the sole link between Indians and the Government, is a thing of the past.

Indian involvement in decision-making was guaranteed and made an integral part of policy planning by the issuance of an Executive Order (also on March 6) which established a National Council for Indian Opportunity under the chairmanship of the Vice President of the United States and provided for the appointment of six Indians to membership.

The other members of the Council include the Secretary of the Interior; the Secretary of Health, Education, and Welfare; the Secretary of Commerce; the Secretary of Labor; the Secretary of Housing and Urban Development; the Secretary of Agriculture; and the Director of the Office of Economic Opportunity. The entire Federal consortium of economic and social development agencies is thus to be integrated into the Indian assistance effort.

Meanwhile, the tenor and direction of programs administered by the Bureau of Indian Affairs had been modulated to reflect the President's intentions. The measure of success can best be illustrated in terms of developments in the areas of legislation, manpower training and employment, educational opportunities, and community planning.

The laws of Congress link about two-thirds of the Nation's Indian population in a special and unusual relationship with the Federal Government. The Secretary of the Interior, under law, is trustee for most Indian-owned lands, an arrangement that grew out of treaties and similar agreements negotiated by the United States with various Indian tribes.

Any modification of the trusteeship concept requires an additional act of Congress, and consequently each new Congress has been concerned with Indian affairs.

For example, Congress established the Indian Claims Commission in 1946 (with a 20-year life span), to permit Indian tribes to sue the United States for further redress for lands taken in the 19th Century. The present 90th Congress extended the life of the Commission, and enlarged the membership to five judges to accelerate action. Over a 7-year period, through June 30, 1968, more than $216 million in awards have been made by the Commission. For many tribes, such income represents an opportunity for launching into business and industrial pursuits, establishing higher education aid funds for students, improving tribal ranching and farming enterprises, building community centers and homes for the elderly, and improving rural areas through tribal electric cooperatives, law enforcement services, and roadbuilding.

Indian Aid Budget Soars

The 90th Congress also provided the largest budget in history for Indian aid. For fiscal year 1968 the Bureau of Indian Affairs received $240 million; the Division of Indian Health, U. S. Public Health Service received over $91 million; and additional funds were channeled as follows through other Federal agencies: HUD, $15 million; Commerce, $25 million; U. S. Office of Education (HEW), $20 million; Agriculture, $5 million; and the Office of Economic Opportunity, $15 million.

Equally important is the support the 90th Congress has given to social development concepts. Enacted early in 1968 was a law to increase the authorization for the BIA's Indian vocational training from $15 million to $25 million annually. Another, which went into effect a few months earlier, enabled Federal schools for Indians to benefit under the Elementary and Secondary Education Act of 1965. Restrictions have been lifted against BIA's providing higher education aid for Indian students in sectarian colleges. The 1966 Education Professions Development Act and the new Bi-Lingual Education Act are also under scrutiny for revision to benefit Indian schools.

The Constitutional rights of American Indians were given further safeguards under the new Civil Rights Act of 1968; and a Senate Concurrent Resolution was issued and hearings held in response to Indian desire that Federal Indian policy preclude summary or premature termination of the trusteeship relationship.

The Department of the Interior gave full support to the foregoing actions by Congress. It also continues to urge Congressional action on other long-standing issues, particularly those involving fishing treaty rights; the administrative problem of fractionated ownership of Indian lands in heirship status; the matter of Alaskan Natives' land claims; and the proposal for an Indian development fund as an incentive to accelerating resources development.

A new concept in resources development as a whole was injected into the BIA's operations with the advent of a new Assistant Commissioner for Economic Development. "Let's think in terms of the Year 2,000," this new assistant commissioner says, "Let's think of economic development in terms of human development. And let's get the Indian people to steer the course."

Assets Take On New Meaning

Indian areas have manpower—one of the great reserves of the Nation. Indian areas have resources in abundance — rivers, forests, rangelands, coal, oil, gas, uranium, and some of the greatest scenic beauty in the world. These assets have new meaning in the technological economy of present-day America.

Indians have begun to take the initiative in land-use planning around these resources, the end view being social as well as economic development of Indian communities. Thirty-two tribal industrial development committees are operating, and $12 million in tribal funds have been committed to generating jobs through community development.

The planning has taken forms and turns that clearly demonstrate the ability of Indian leadership to attune tribal objectives to the growth patterns of the Nation.

A joint range improvement project won an award from Interior for the Denet Tsosie-Willie Shirley Navajo families. Their 11-year contest reclaimed 5,000 acres from scrub brush to lush grass.

To encourage the trend, 15 of the largest Indian areas were recently given preference in the award of Federal procurement contracts.

Reservation planning is being keyed to regional planning. For example, tribes in the southwest are actively interested in the new Four Corners Regional Commission; the Cherokees of North Carolina are relating their economic hopes to the Appalachia planning system; and the Ozarkia Development Commission is becoming involved with Indian groups in the redevelopment belt west of the Mississippi. Road-building, new water sup-

plies, job training, creation of industrial parks, and planning for schools in redevelopment areas are activities that Indians and non-Indians are discussing together around the regional conference tables.

Economic alliances among different tribes also appear as a new trend. Fourteen Indian tribes in Arizona, for example, have joined together to form the Indian Development District of Arizona, thereby becoming eligible for new kinds of Federal development aid. Planning grants, construction grants and loans, technical assistance grants, and training grants form parts of the package.

Tribes Merge Economic Interests

Individual tribes, too, have merged economic interests with neighboring communities. The Gila River Pima-Maricopa Reservation in Arizona is engaged in a multifaceted upgrading effort in unison with neighboring cities of Chandler and Coolidge. Indian and non-Indian lands have been set aside for industrial parks, a joint effort was launched with great success to attract new industry to the area, and recreational and educational plans are well under way.

In New Mexico, the traditionalist Zunis designed a 24-point program that calls for agricultural development, expansion of arts and crafts, commercial-industrial planning, and a new community approach to education.

The Mescalero Apaches of New Mexico took the plunge in 1968 with an investment of nearly $2 million to expand their ski resort; and in Warm Springs, Ore., Indians added another $4.3 million to their initial million-dollar venture to make their Kah-nee-ta Resort the choicest tourist spot in the far West.

The White Mountain Apaches of Arizona are converting parts of wilderness Geronimo country into stream-fed man-made lakes for tourists; and, to preserve the old ideas while capitalizing on new opportunities, they recently dedicated several thousand acres as a perpetual Primitive Area.

Tribes which own good forest lands are now operating their own sawmills, processing plants, trucking businesses, and even manufacturing plants. Most of these operations were performed by non-Indians only a few years ago. The Navajo Forest Products Industries received a Conservation Award for leadership in scientific forestry and conservation. Most of their operations are in Arizona.

Navajos Run Their Own Show

The Navajos are operating their own public power and water utility and are looking to a growing customer market in the new industries moving into the area.

Where once the term "welfare aid" was a byword, it is gradually being supplanted by discussions of "gross receipts and net profits," "tax benefits," "job orientation" and even "socio-economics as a basis of planning."

And where the term "school" was a one-syllable synonym for "place to learn the white man's ways and place to run from as quickly as possible" now the school is becoming the heart of at least a few Indian communities — a place where there are no fences to keep the family outside and the children in, a place where conflicting cultures can synthesize rather than polarize.

The new emphasis is upon teaching Indian children in their own language and about their own heritage. The BIA has stepped up its higher education aid program in the hope that more Indians will be attracted to the teaching profession. As fast as new textbooks can be written, they will supplant the "Dick and Jane" primers and the history books that denigrate the role of Indians in the making of America.

Although public schools enroll more than two-thirds of the 150,000 or more school-age Indian children, little, if any, cooperative planning had been done between Federal and public school authorities until a year or two ago. Public schools serving Indians suffered from the chronic ailment of under-funding which prevented them from giving any attention to the special needs of children who were disadvantaged because of language or other difficulties of cultural apartness. Indifference to the peculiar needs of the culturally different child was the distinguishing mark of most schools — including some of the Federal schools — attended by Indians.

"Wherever the problem exists, it is our responsibility to muster all resources to correct it," declared the new Assistant Commissioner of Indian Affairs for Education. In effect, he had made a policy pronouncement that charted a whole new course in Indian education.

He began by tapping to the roots the technical and funding capabilities of the U. S. Office of Education. Meetings were held with public and Federal education authorities to exchange ideas rather than epithets. Public and private universities and other research institutions are being put to work uncovering answers to such basic questions as how much adjustment in curriculum is necessary to strengthen motivation of the "alien" child; and at what point in the school process does "holding power" over such children drop precipitously?

Also under scrutiny is the BIA's own school system which consists of 163 day schools and 80 boarding schools. Twenty-six of the schools offer high school work. In addition, the BIA operates schools in three hospitals and maintains 19 dormitories in which students live while attending public schools. Answers to some fundamental questions are being sought:

Is it better to have many small day schools serving small communities, or fewer but larger and better equipped schools? Are the high schools offering adequate preparation for either the world of work or study for the professions? Are the geographic locations of these schools anachronistic in some instances? Would it be possible to use one or two of the more adequate boarding school campuses to enter upon an experiment in developing a model school? Or can model excellence be spread mantle-like across all the schools?

Indian toddlers head for nursery while parents train for jobs. A young Indian artist seeks herself on canvas.

The term "excellence" is being employed to encompass quality teachers; quality instructional materials; the full use of teaching aids including, where appropriate, closed circuit television; pre-service and in-service opportunities for teachers and administrators to improve their skills; development of a system of teaching English as a second language; emphasis on pre-school and kindergarten (the latter inaugurated in the BIA system this year); development of accurate testing devices to measure ability and achievement of the "culturally different;" intensive guidance and psychological counseling; and curricula organized to provide a cohesive and fully adequate preparation for either vocational or higher education.

An integral part of the "excellence" package is provision for Indian participation in education planning. An Indian advisory committee already is operative. Indian school boards have been made a mandatory aspect of Federal schools and Indians are being encouraged to take part in public school affairs. In one instance — on the Navajo Reservation — the tribe itself is operating the school, using a new building constructed by the BIA; and the contracting of education responsibility to other tribal groups is under consideration.

Just as the "whole child" approach is being applied to elementary and secondary education, the "whole person" approach is being applied to manpower training. A job is more than a job — it is a way of life. Proper preparation for a way of life distinguishes the successful and satisfied worker from the indifferent and frustrated one.

A "family-focus" training system has begun for hard-core poverty families. Occupational training for potential wage-earners is coupled with pre-job orientation for trainees to acquaint them and their families with the requirements of industry and the expectations of the community, the responsibilities for personal fiscal management and orderly home life, the importance of health care and the importance of being an active citizen of the community.

Emphasis upon the needs of the people is stimulating economic growth in Indian areas even as it brings about progressive social change. At this point in time, however, social developments are the ones more generally conspicuous. For example, 27 Indians were elected to state and national offices in 1966; and political action took many new forms, including the participation of more than 100 Indians, young and old, in the 1968 Poor People's March on Washington.

Economic progress this far is spotty, and deep rural poverty still prevails in most Indian-populated regions. The balance of progress against need can be shown in such statistics as the following:

— Returns from Indian resources reached a new high of $255 million in 1968; but only about half this income goes to Indians because many of their resources are leased to non-Indians.

— International industries like General Dynamics and Fairchild Camera and Instrument Corporation are among the 125 private industries operating in Indian communities, creating 10,000 new jobs — but still more than one-third of the Indian labor force is unemployed.

— Nearly 10,000 homes have been built or are in planning stages and many others have been renovated — but still thousands of Indian householders live in shacks and shanties.

— Nearly 5,000 Indian high school graduates entered college in the school year 1967-68, most of them with substantial Federal or tribal assistance; but the number who quit high school is double the national dropout rate.

To bring about a complete reversal of these conditions requires a kind of dedication that money alone cannot generate. The Federal financial outlay for Indians is impressively generous at present. The question no longer is, "What are we doing for the Indians?"

The question now is one which only the Indian people themselves can answer: "How far are they willing to commit themselves to the principles of self-determination through *participation?*"

The Indian's respect for himself and faith in himself are being put to test. With the emergence of the new Indian leadership, the forecast is bright.

Office of Territories

TRUST TERRITORY. In the tropical oceanic expanse of the Western Pacific administered by the United States as the Trust Territory of the Pacific Islands, conservation is a concept just beginning to take root. Although a few islanders practice conservation without formally defining it, the need for conservation education throughout the territory is urgent.

In this part of the world, where land and fresh water are precious, respect for nature's bounty is natural and commonplace. Micronesians in their native state, long ago learned to live within the limits of their environment. With the advent of the modern world, however, more advanced lessons of conservation are urgently needed. So far, these have too often eluded the Micronesians. Indeed, some of the Islanders are paying dearly for not having learned earlier.

Dynamiting and poisoning the lagoons doom the catch of future fishermen. Wanton slaughtering of the succulent fruit bats of the Marianas and the hawkbill turtles of Palau spells meager success for tomorrow's hunters. That the seas are not irreversibly bountiful, forever regenerating — that wild game will not endure incessant hunting — these are hard lessons to remember in a corner of the world where the ancient Islanders were catered to by land and sea. The lessons are taught — by nature and by man — and they are being learned in indelible fashion. Laws have been enacted, people are being trained, preserves have been set aside. The centuries have accustomed the Micronesian to take, to eat, and let tomorrow come. Change comes slowly, but conservation is awakening in Micronesia.

AMERICAN SAMOA. American Samoa is on the move — from a simple, traditional society related directly to the sea and the soil, to a complex, sophisticated society in which a predominantly wage-based economy thrusts itself between the people and their land. A wise, people-oriented conservation can be the binding factor in putting to highest use the territory's human and natural resources.

At the same time that educational, health, and economic development programs are being emphasized, Samoa has started developing recreational areas and establishing parks, beaches, and swimming areas. School children are active in coordinated beautification programs which include the planting of many varieties of the island's lush plant life. As economic development, accelerates in American Samoa, agriculture and fishing face increased pressures from the rapidly growing population. Modern concepts of health and nutrition add to the new burdens of responsibilities. The traditional net-caster and spear fisherman no longer can supply the

Descendants of an unexcelled line of primitive navigators, Samoans stroke a many-oared fautasi to a rowing tempo beaten by bow man on an empty tin can.

needs of the community and the old ways are giving way to improved fishing methods and conservation practices. Improvements in agriculture and the introduction of new or improved crops are underway.

Urbanization and the wage economy are growing. If these new factors are combined with an understanding and appreciation of conservation of Samoa's unique, often exotic plants and wildlife, and her outstanding scenic and natural resources, the result will be a new and better way of life for the Samoan family and community.

GUAM. The Guam Women's Club, a 130-member service organization, took the lead this year in the Territory's conservation efforts, sponsoring an island-wide beautification campaign. A proclamation designated April as Guam Beautification Month.

The First Lady of Guam was honorary chairman of the campaign. Village Commissioners encouraged residents to plant and paint in a club-sponsored village beautification campaign (Inarajan, a picturesque settlement on the southern shore, took first prize, with almost every house in the village sporting a fresh coat of paint). Girl Scouts and Brownies cleaned up beaches, painted dilapidated school bus stop shelters, and planted flowers around government offices. Cub Scouts tidied up an historic landmark.

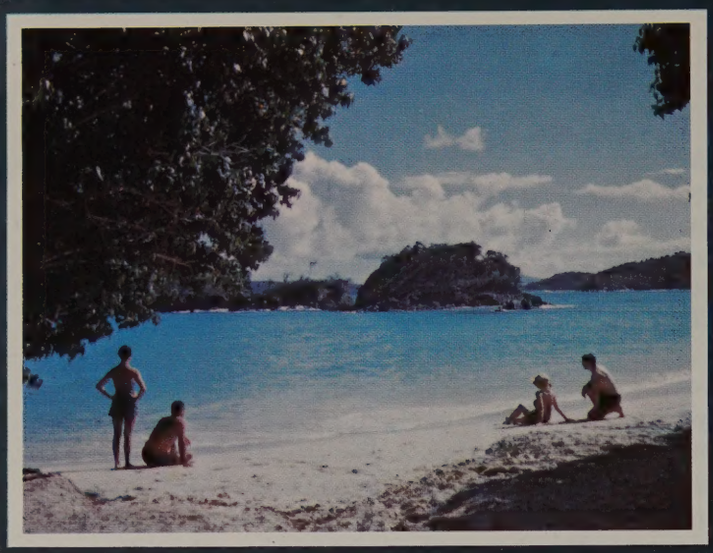
Publicity was the key to success. All newspapers, radio, television, and schools participated in the Campaign. The Guam Women's Club was a prize winner as one of the finalist among 12,000 participants in an international community improvement program competition sponsored by the General Federation of Women's Clubs.

Guam's young people are also active in conservation work. The project of the El Centro 4-H Club of Didigue typifies the concern of the younger generation. The Club's project: to restore a dike that was built by Spanish prison labor almost a century and a half ago. The youngsters, working after school and on weekends since last fall, cleared away a jungle of weeds and underbrush, revealing a 200-foot-long native stone structure in a surprisingly good state of repair. Now they need only replace a few stones that have crumbled away and put in a new wooden sluice gate and the dike will be back in operation.

El Centro Club members hope that once the flow of a stream is controlled again, a section of the swamp can be reclaimed for recreation. They envision picnicking, fishing, and boating. The dike was built in 1832, during the administration of Governor Francisco Ramon de Villalobos, by prisoners brought over from the Philippines.

U.S. Navy Photo

An island campaign for beautification that starts with a series of natural settings like this can scarcely flop — even if it never gets off the ground.



Trunk Bay (left) in the Virgin Islands National Park and Buck Island Reef off St. Croix, with underwater trail, are high on the Islands' natural assets list.

VIRGIN ISLANDS. In the waters of the south Atlantic Ocean, where it forms the Caribbean Sea, lie the Virgin Islands. The three major inhabited islands are St. Croix, St. John, and St. Thomas. The area is one of the best known and most beautiful tourist spots in the entire West Indies. An estimated 900,000 visitors, spent more than $105 million, when they visited the islands in 1968 to enjoy the climate, the beaches, crystal waters, and free port shopping.

Many new businesses were established. To protect historic landmarks and to conserve the natural beauties of the Islands, the government of the Virgin Islands, working with private citizens and organizations, has begun an intensive grassroots conservation program.

Established to foster an awareness among school children and adults of the need for conservation, a government beautification effort is in full swing. To coordinate this program, the Virgin Islands government established on July 1, 1968 a separate department to deal with conservation and environmental resources. Planting, landscaping, and other projects were started. Many old estates are being restored to preserve the charm of the Danish days.

One of the completed projects is the rehabilitation of a magnificent grove of palm trees fringing beautiful Magens Bay. Several laws to prevent pollution of air and water have been enacted. Another new law requires ships docking at the St. Croix petroleum refinery complex to empty their oil-laden water ballast into tanks on shore rather than at sea.

A noted environmental planner was hired to develop a territory-wide master plan to provide sound guidance for the future.

Sturdy grassroots conservation requires coordinated effort of all citizens. This theme is being advanced with pride and vigor in the American Virgin Islands.

Job Corps

Corpsmen at the Job Corps Civilian Conservation Center, Harpers Ferry, W.Va., are learning the ancient art of stone masonry and absorbing history at the same time. In one of the most impressive Job Corps work programs, corpsmen excavated and restored the Civil War battlefields at Antietam, Md.

Today Antietam is a series of peaceful, sloping meadows. Wild flowers blow in the tall grass. All around, the cornfields roll out as far as the eye can see. There is little to remind a visitor that in September 1862, the meadows were strewn with the bodies of 23,000 Americans, all of them killed in one of the War's bloodiest battles.

Harpers Ferry corpsmen found out how bloody it was. While digging up countless examples of the debris of war, such as bullets, cannon balls, and weapons, they uncovered bones identified as human. Corpsmen tagged their finds for museum people and archeologists. Digging, however, was only a small part of the program: corpsmen also laid asphalt trails so visitors can walk through the scenes of battle. Stone walls, like the walls that stood in 1862, were built. At different places along the walls, visitors will hear recorded descriptions of what took place at that spot during the battle.

A master stone mason, considered one of the best historic masons in the country, came out of retirement to teach the corpsmen historic masonry. He learned his trade from his father, who laid walls at Antietam many years ago, and now he has passed on the ancient secrets to a new generation of craftsmen.

Job Corps is a special residential program for disadvantaged youths from the ages of 14 to 21. Since the opening of the first Job Corps Center in January 1965, nearly 150,000 poverty youths have benefited from Job

Conservation corpsmen plant bitterbrush in a Utah canyon, install facilities at a Colorado forest camp; work that builds both human and natural resources.

Corps training. In fiscal year 1969, some 35,000 youths will serve in 75 Civilian Conservation Centers operated by the Departments of Agriculture and Interior, conserving and developing the nation's natural resources. Simultaneously, they receive intensive courses in basic education (40% are functionally illiterate) and work-experience training.

Office of the Science Adviser

The environment of our planet, including its living elements, is extremely sensitive to change: modification of any one part of it has inevitable, and sometimes serious effects on other elements. In the past, agencies and individuals have pursued their missions without much thought to pooling their resources for a more effective attack on related problems. The complexity and far-ranging effects of modern technology are fast changing this attitude. The Department of the Interior not only coordinates the research and development activities of its various bureaus, but also attempts to relate them to work of other departments.

An example is the large weather-modification research and development program being conducted by Interior's Bureau of Reclamation, which, if successful, may make it possible to augment greatly the water supplies in the Colorado basin and elsewhere. This undertaking has obvious relationships with studies by the Department of Agriculture to control hail and lightning, and research by the Department of Commerce on hurricane suppression. By influencing precipitation patterns, all these developments can have marked effects on communities of plants and animals. Therefore, the impact of such changes requires careful evaluation before weather control can be put into effect.

An important function of the Science Adviser's office is to coordinate research and development in the Department as well as with those of other agencies, especially in programs of far-reaching ecological importance. This sort of overview is increasingly important as technology provides us with means for making large-scale and often irreversible changes, both on purpose and by accident, in the world around us.

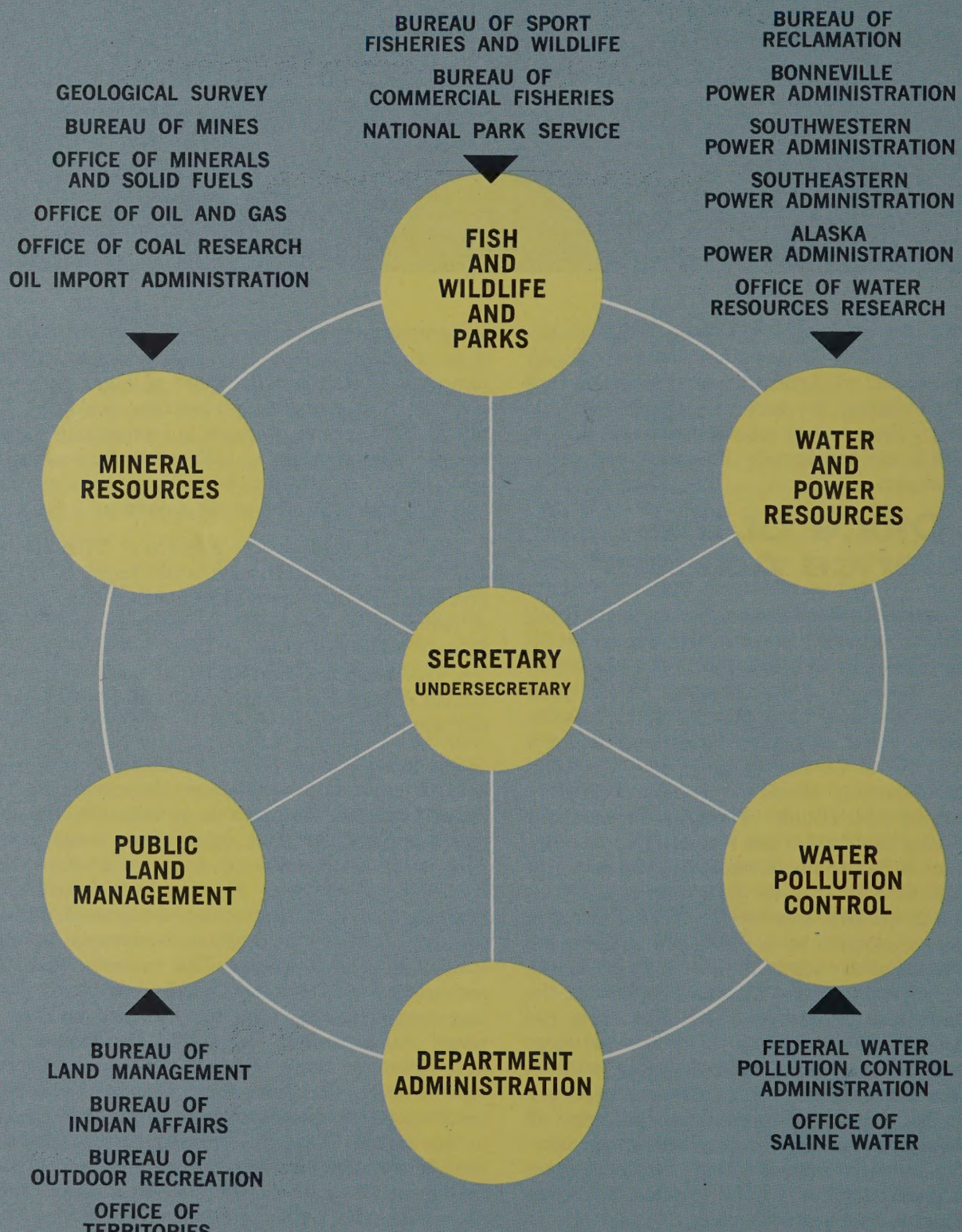
The development of the Supersonic Transport Plane (SST) with its bothersome sonic boom is typical of problems that often parallel technologic benefits to man. A team, under the guidance and coordination of the Science Adviser, is studying all of the sonic boom problem aspects and is exerting its influence to insure that human needs for a tranquil and restful environment are not ignored.

Our goals in conserving and efficiently utilizing the natural resources of our country, in providing adequate recreational facilities, and in maintaining the quality and beauty of our land, involve long-range programs. The parks and recreational areas we develop now will be used for generations. We must look ahead to energy, mineral, and food requirements for several decades, if we are to make wise decisions concerning appropriate conservation of resources. The research, both in the natural and social sciences, required as a basis for such long-range planning must be equally broad and long-range. An important function of the Science Adviser is to assist the Secretary of the Interior and members of his team in identifying those elements in the Department's scientific program that are particularly critical in this regard. Thus the Department looks beyond its own laboratories and brings such problems to the attention of the nation's scientific community, enlisting its help in solving them.

General Organization of the

UNITED STATES DEPARTMENT OF THE INTERIOR

"America's Department of Natural Resources"



UNITED STATES DEPARTMENT OF THE INTERIOR

Report to our stockholders... the American People

FISCAL YEAR 1968

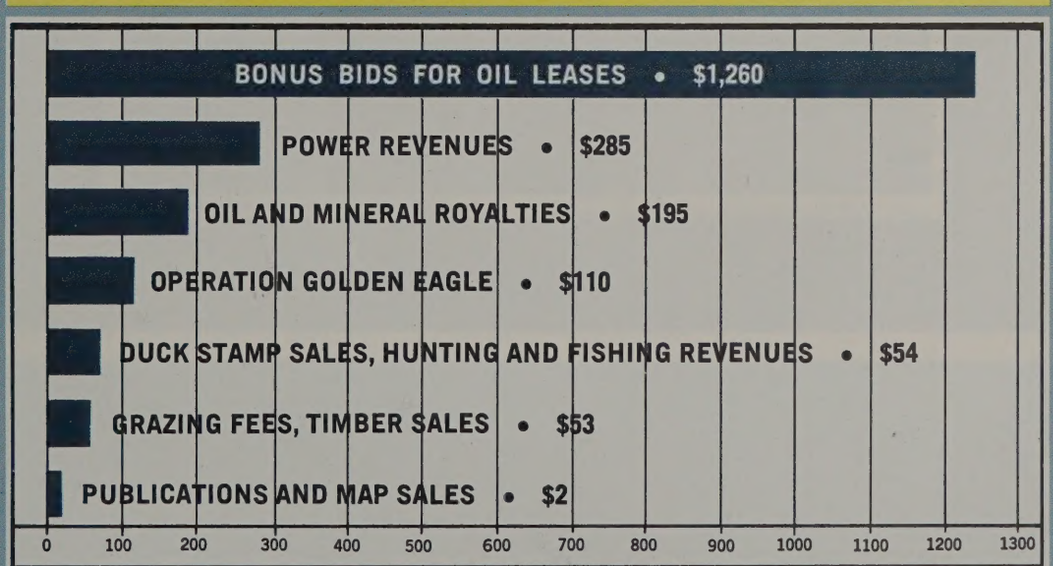
How Your Conservation Dollars are Invested

APPROPRIATIONS BY THE U.S. CONGRESS FOR THE DEPARTMENT OF THE INTERIOR — $1,804 MILLION

Returns From Your Conservation Investments

RECEIPTS
$1,959 MILLION

INCOME REALIZED BY THE DEPARTMENT OF THE INTERIOR AND RETURNED TO TAXPAYERS THROUGH LOCAL, STATE, AND NATIONAL PROGRAMS, OR TO THE U.S. TREASURY.



Favorable Balance —

Receipts over Appropriations..... **$155 MILLION**

ESTIMATED JULY 1968

"Today, man, rather than the impersonal forces of nature, exerts the decisive influences on the shape of the future. And with each year, this power increases."

Senator Henry Jackson
Washington

Excerpts from remarks by Secretary of the Interior Udall before the joint House-Senate colloquium to discuss national policy for the environment July 17, 1968.

Let me suggest some basic principles:

1. We must begin to work with, not against, the laws of the planet on which we live, rejecting once and for all the false notion that man can impose his will on nature. This requires that we begin to obey the dictates of ecology, giving this master science a new and central position in the Federal scientific establishment.

Conservation in Action

Burrow awhile and build, broad on the roots of things . . . Robert Browning.

While blight and pollution and resource-stripping continued to pile environmental insult upon injury, the conservation movement "burrowed awhile" and developed a broad root system.

All over America, people who never considered themselves environmentalists, or ecologists, or even conservationists, began to wrinkle their noses, rub their eyes, hold their ears, and wonder what was happening to their land.

Their wonder grew, and turned to alarm. They sensed through every warning system an increasingly sleazy world. And then, first by ones and twos, and then by hundreds and thousands, they rebelled against the cheapening process.

On this grassroots foundation of awareness, rebellion and yearning, conservation is astir and moving. The burrowing time is past; the building time is here.

Secretary of the Interior Stewart L. Udall on May 7, 1968, in an address before the White House Conference of the Advertising Council, suggested that the meek may not care to inherit the earth "if the pace of our pillage continues to grow."

Even the meekest, however, were already taking up the challenge. Everywhere they were bent to the task of improving their inheritance. The following is a necessarily sketchy, but representative litany of their works.

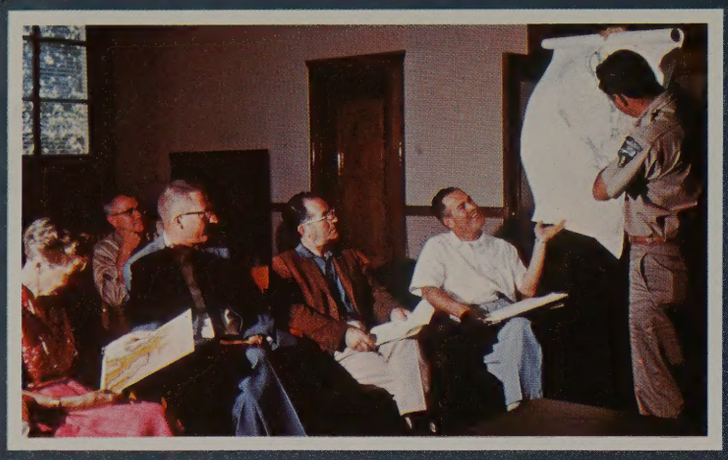
An energetic citizen of Illinois, Ralph Frese, helped organize a massive canoe trip down the lower Fox River for the attorney general of the State and 60 guests in an effort to enlist aid in protecting the few free-flowing scenic rivers left in northern Illinois. Frese brings the decision-makers to the site and puts them afloat. "After that," says Frese, "I let the river tell my story."

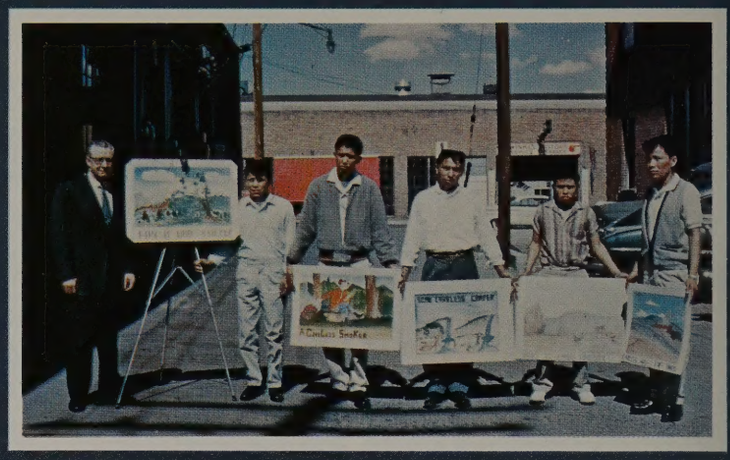
The Maple Creek Improvement Association of Seattle, Wash., got together in 1963 to battle for preservation of their tranquil, wooded enclave, wedged between two traffic-clogged main streets. They won the fight to keep the city from straightening and widening the road through their serene section, and have since stayed organized to fight off intermittent threats—such as the dumping of garbage and dirt into the wild ravine that backs most of their homes. The gainers? Seventeen families, assorted raccoons, squirrels, pheasants, ducks, at least one owl, and the city of Seattle.

The Boy Scouts of America in 1968 up-dated the requirements for their Conservation of Natural Resources Merit Badge to meet the changing, ecological nature of the new conservation. The merit badge revisions recognize the need to end the patchwork approach to our environment and to consider the earth as an interlocking whole.

In July 1968, nearly 300 Camp Fire Girls of high school age converged at Estes Park, Col., for a four-day focus on natural resources caught in the cross-currents generated by concerned industry, government, private and civic groups. In groups of 30, the girls then dispersed to various target areas for 12 days of on-the-spot discovery. They returned to Estes Park to

2. We must espouse the creation of an order which not only promotes the well-being of the living but enhances the total environment—the basic wealth we bequeath to our children and their children. We must reject any approach which inflates the value of today's satisfactions and heavily discounts tomorrow's resources. The fact that something may be cheaper, more efficient or more convenient must no longer be decisive: the well-being of generations yet to come must first be weighed in the balance.





examine their findings—to achieve a responsible, balanced approach to conservation, use and preservation of natural resources.

Youngsters in Park Ridge, N.J., make off-season use of a Pocono Mountains summer camp as an outdoor classroom where they meet nature at the grassroots level. The natural wonderland experience is a week-long event, fall and spring, for Park Ridge sixth graders. Andrew L. Sim, assistant to the superintendent of schools, says they learn about beavers, how to change the flow of water, the ways of birds. They absorb conservation.

"But the key thing is the social value," said Sims. "They learn respect for others as well as for themselves." They also learn respect for their world and the other creatures and plants that inhabit it.

In order to dramatize what must be done to save our environment and how technology can be the hero instead of the villain, students of the Institutes of Technology at California (Cal Tech) and Massachusetts (MIT) engaged in an electric car duel in the summer of 1968. Each campus built a fumeless buggy and raced its products to the other's campus.

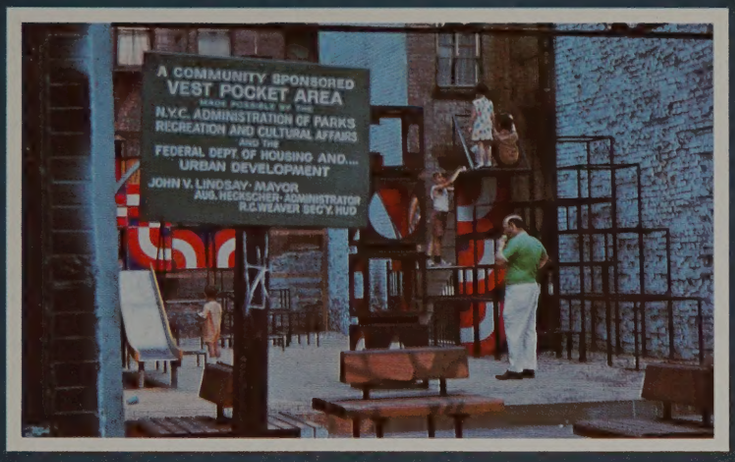
National conservation groups furnish excellent information on both general and specific areas of conservation concern, to help individual citizens understand all sides of an issue that affects the environment. The Wilderness Society, for example, has about 1,300 "leaders" in communities all over the Nation . . . direct, live plugs into the grassroots. When a controversial issue is coming up in Congress, these leaders are provided with information pro and con. The leaders then try, at the community level, to interest other citizens in letting their own views on the issue be known to members of Congress or public officials.

In Jonesboro, Ga., the Women's Club members mounted ladders and painted store fronts for the town's merchants as part of their general beautification plan.

Bonds for urgently needed new sewer and water systems were voted in Basin, Wyo., as a result of a house-to-house educational campaign on the need, conducted by the town's clubwomen.

The Community Club of Hockessin, Del., faced outright antagonism along with apathy when it organized the Hockessin Area Development Association, sparking community cooperation in solving problems of blighted areas,

3. We must sharply define our concern for specific resources, making crystal clear that plans to protect air and water, wilderness or wildlife are in fact plans to protect man. Our efforts to enhance these resources must be based on the premise that such action is essential to the self-renewing systems of nature that sustain the earth.



Local folks have their say about public land changes in their area. Youngsters compete in contests to inspire better community action. A vest-pocket park lights up a formerly drab neighborhood. At home, in meeting halls, on street corners, wherever grassroots flourish, good stewardship grows.

sewage and water, zoning and recreation, and other needs. The club won the $2,000 fourth prize in the 1968 Community Improvement Program competition, sponsored by the General Federation of Women's Clubs.

Some people's "individual grassroots action" consists in speaking out on problems where they have special professional competence. Dr. Garrett Hardin of the University of California, who possesses such competence in the area of supersonic "boom," was quoted on the national press service wires in the spring of 1968, speaking of the boom:

"Experiencing it is like living inside a drum beaten by an idiot at insane intervals."

Apparently some determined citizens share Dr. Hardin's view of this kind of "progress." A Citizens League Against the Sonic Boom, headquartered at 19 Appleton Street in Cambridge, Mass. 02138, is concerned with the physiological and psychological effects of the boom on humans and wildlife.

In California, a single nonprofit organization called the Planning and Conservation League was formed in 1964. Two dozen persons, representing many of the most powerful conservation and planning organizations in the state, joined forces for a single, fulltime, sophisticated lobbying effort to achieve state legislation in the planning and conservation fields.

Their story was told in the *New York Times* on March 17, 1968, by William D. Evers, who noted that "certain important maxims can be derived from the successful experience of the PCL. They are:

"1. Organize statewide.

"2. Have an executive committee consisting of architects, planners, lawyers, businessmen and conservationists who are not idealistic 'do-gooders,' but a coalition of professional people who do know what is happening in the business and political world.

"3. Involve the experts and anyone with the will to work in the process of forming a legislative program.

"4. Have a good lobbyist.

"5. Concentrate solely on state legislative issues. Hundreds of requests to get involved in local or national issues are received. To respond to them only weakens the state effort and offends other groups.

"6. Follow through from beginning to end on a piece of legislation—this increases the legislators' respect.

4. We must establish as a principle of national policy that the relationship between our population and our finite resources is a major concern of the Federal government. No comprehensive policy for our environment can fail to include recognition of the hazards of irresponsible population growth. The Federal government has for too long resisted involvement in this central issue.

"7. Do not introduce wild, far-out schemes—this decreases the legislators' respect.

"8. Raise lots of money.

"9. Go after organizations as members but seek individual memberships as the prime source of financial support.

"10. Find good men who are willing to devote a great deal of time to the cause without compensation.

"11. Keep all members informed.

"12. Let all the members of the legislature know about your program and presence."

And then there are the advertisements run by large business and industry, which represent a kind of grassroots action at the corporate level as they invite and instruct individual citizens to act on their own.

"A little town put up a big fight, and now this natural beauty is yours to enjoy." This is the headline on a recent "conservation series" advertisement sponsored by a large industry. It tells how "outsiders tried to drain Georgia's Okefenokee" swamp, unaware that the waters were really sweet and pure; how they slaughtered game, hauled out giant cypresses, and generally made the folks in nearby Waycross good and sore.

The townfolks organized, enlisted the help of Cornell University, the National Audubon Society, the American Museum of Natural History, and others; they got after the state, and "finally succeeded in getting Uncle Sam to protect Okefenokee by making much of it a National Wildlife Refuge."

This Refuge is now a key part of the System administered by the Department of the Interior. But it represents a giant cooperative effort that started with a small town, its local newspaper editor, Liston Elkins, the Waycross Chamber of Commerce, and the aroused townfolks who raised $100,000 and got the State to lease back additional land and create a magnificent park.

This and other ads in the industry conservation series are designed to encourage more private citizens to help preserve our natural heritage.

The Institute of Life Insurance is running a similar series. It tells in dramatic detail what has happened to our environment and what some people are doing to help.

"As a start," one ad says, "thousands of suburbanites have gone to East Harlem, and together with local residents, embarked on a face-lifting project to clean, repair and repaint along neighborhood streets . . ."

After listing several more projects, the ad concludes: "It's up to all of us."

In a very real way, that's what grassroots power amounts to—"all of us." The grassroots represents a vast well of potential good. It awaits only the information to spark intelligent decisions; the discipline to take thoughtful action.

Let no citizen feel he is impotent to effect change in today's crowded world. Everyone is concerned about his own back yard. If all the "back yard conservationists" were to stretch their vision just a little beyond their own boundary fences, America would have a natural conservation task force standing literally "at the root of the problem"—every environmental problem that besets us.

Let there be among them a liberal sprinkling of the "doughty discriminators" called for by Secretary Udall in the Introduction to this book, and theirs will be an army for good that nothing can overwhelm.

But statements of principle are not enough. By themselves, they will not forestall the continuing assault on our environment. They will not stop the inexorable highway construction, the obnoxious boom of supersonic aircraft, the dam building, or the pernicious concept of calculated obsolescence that fouls our countryside. Such statements can only have meaning if Congress and the Executive Branch have the will to give them life through new laws and new policies that reject the old ways.

Community Conservation Checklist

The recipe for a clean, appealing environment has one basic ingredient for which there is no substitute — conservation action at the grassroots level. The community conservation checklist offered here is *not* a national agenda; nor is it by any means an exhaustive list of community conservation programs. It was designed, rather, to start you thinking for yourself — about yourself and your immediate world. Use it as a starting point. It can help you build your own personal program, tailored to the needs of your own area for happier, more livable surroundings.

GOALS

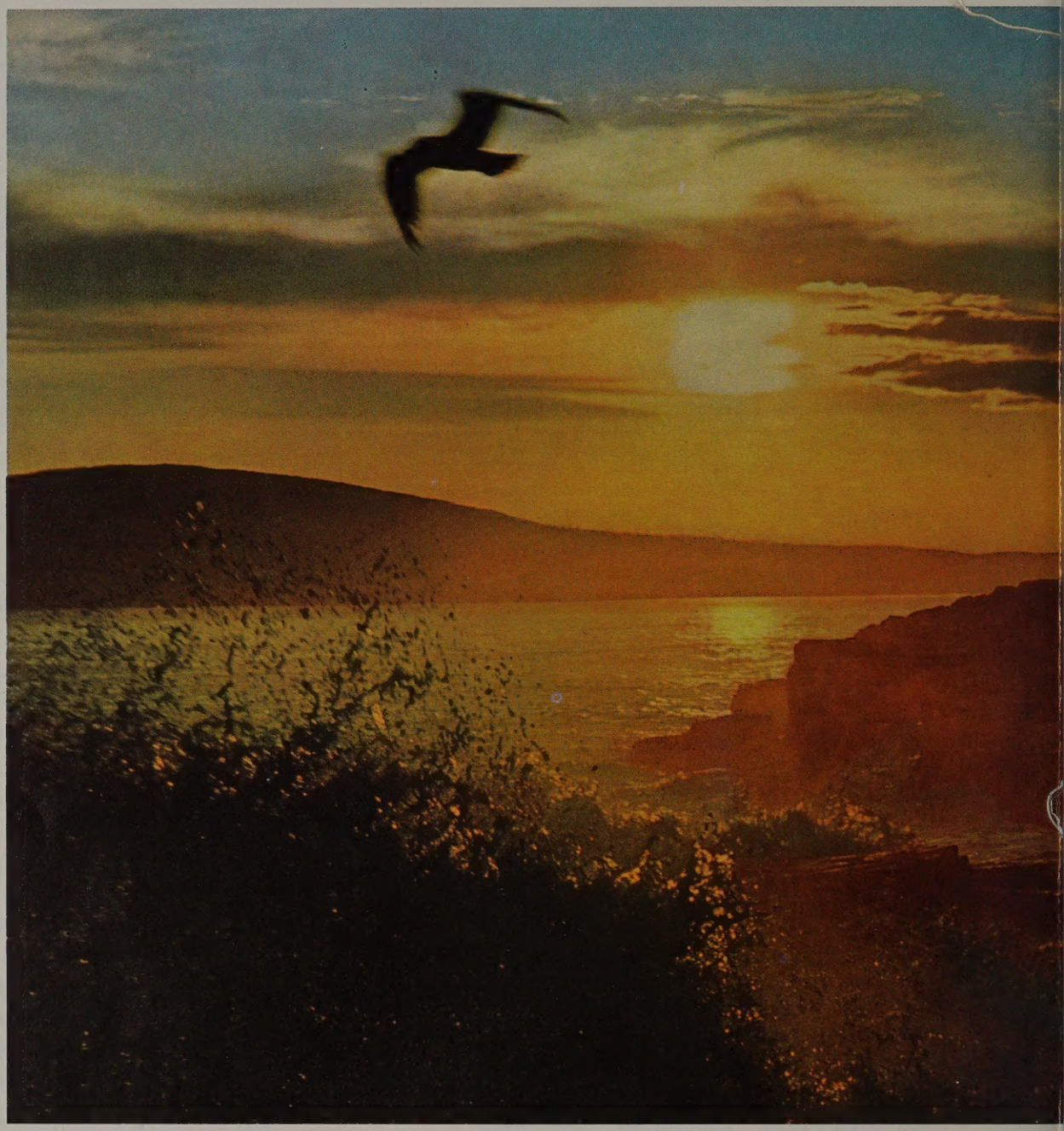
(Things To Work For)

1. Good, balanced community-wide planning.
2. Good zoning ordinances, strongly enforced.
3. Effective conservation agencies.
4. Effective pollution control measures for air and water.
5. Modern methods of solid waste disposal; end to open burning.
6. Effective sign and billboard control.
7. Junkyard screening and control.
8. Adequate open space.
9. Playgrounds, parks and other recreation areas.
10. Attractive, convenient downtown malls.
11. Protection of watercourses, natural areas, especially in or near cities.
12. Protection of wildlife.
13. Trail systems for walking, biking, and jogging.
14. Conservation education in schools.
15. Underground utility lines.
16. Proper maintenance for public places: parks, city streets, etc.
17. Personal code of Conservation Ethics for everyone.

ACTION

(Ways To Do Them)

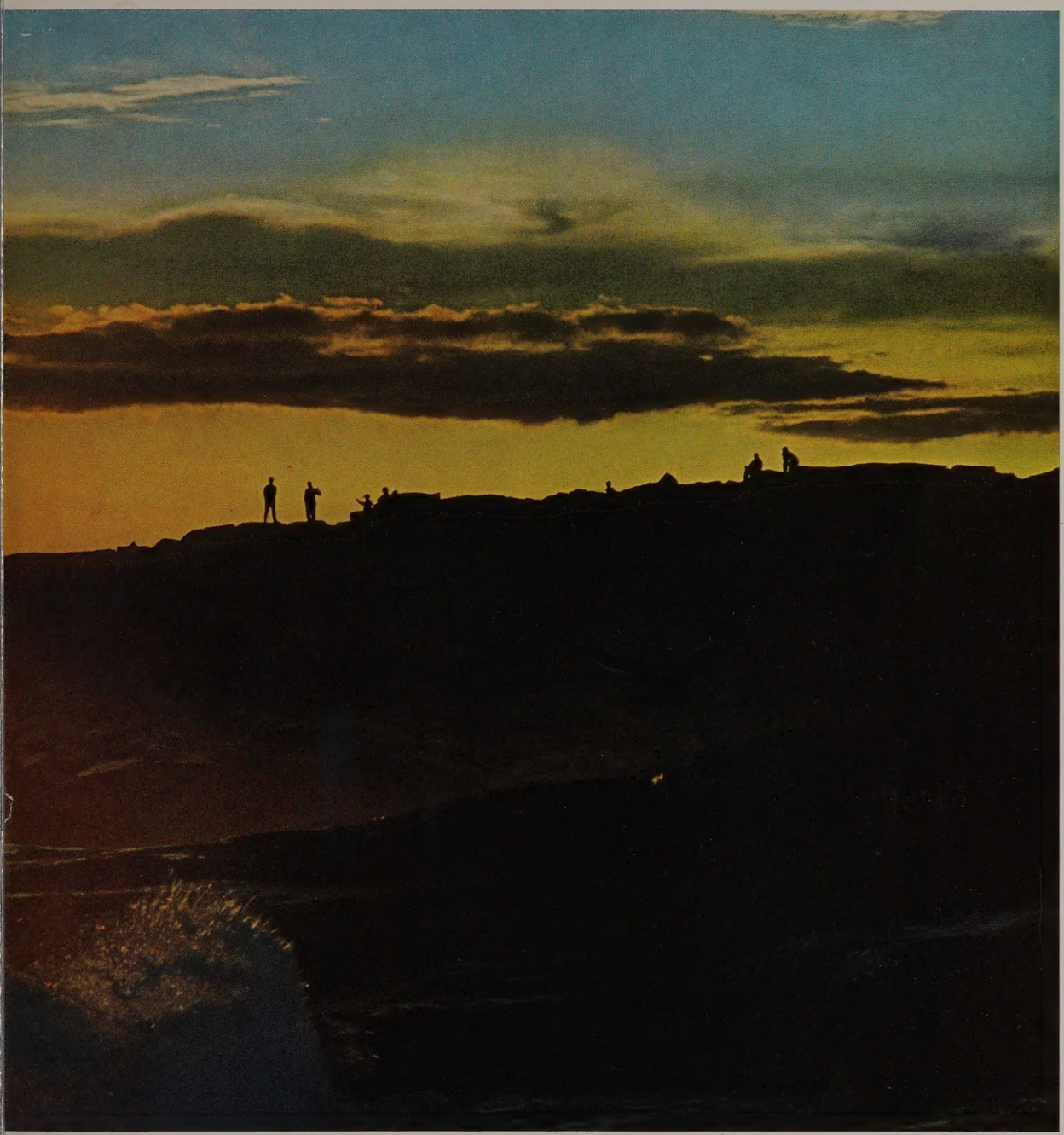
1. Join a group that works for a better environment. If no group exists, organize one.
2. Urge your own organization to undertake a conservation project.
3. Lead a youth group with conservation goals.
4. Beautify your own home and neighborhood.
5. Use pesticides judiciously.
6. Write to local newspapers on behalf of conservation projects.
7. Speak before local clubs, school classes, and on TV and radio programs in support of good conservation practices.
8. Help set up a Beautification Conference.
9. Organize a community clean-up day or week.
10. Appear before the city council, city boards, commissions, public hearings to support conservation goals.
11. Serve on a city board, commission, or advisory group.
12. Write your elected representatives on behalf of good conservation projects.
13. Seek elective office yourself.
14. Support bond issues and tax increases when necessary to build a better community environment.
15. Set an example you'll proudly want others to follow.



Surf splinters over Schoodic Point in Maine as an August sun sinks behind Cadillac Mountain.

"Now, more than ever, the efforts of private citizens and conservation organizations are required in not only preserving what remains of our natural heritage, but also in restoring some of what we have lost."

Senator Thomas H. Kuchel
California



Interior's Conservation Yearbook Series

This Conservation Yearbook series format constitutes both the annual reports and the special reports to the nation which have been published in previous years by the Department of the Interior.

The first of the series, published in 1965, is entitled "Quest for Quality" ($1.00); in 1966 came "The Population Challenge" ($1.25); 1967, "The Third Wave" ($2.00); 1968, "Man – an endangered species?" ($1.50). All available from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

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Created in 1849,
the Department of the Interior
--a Department of Conservation--
is concerned with the management,
conservation, and development
of the Nation's water, wildlife,
mineral, forest, and park
and recreational resources.
It also has major
responsibilities for
Indian and Territorial affairs.
As the Nation's principal
conservation agency,
the Department works to assure
that nonrenewable resources
are developed and used wisely,
that park and recreational resources
are conserved for the future,
and that renewable resources
make their full contribution
to the progress,
prosperity, and security
of the United States--
now and in the future.